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ABSTRACT

Project IMPACT is a locally-initiated, federally-funded attempt to encourage creativity in elementary and secondary classrooms. From a start with nine school districts, it had been extended by its third year to nearly 60 school districts in nine counties. This report covers a one-year inservice program culminating in a 5-week teach-and-study institute. Its major goals were to help teachers examine the many variables which influence the humaneness of the classroom, and to investigate with teachers the research and literature which seem to be helpful in bringing into focus the teacher's role in encouraging productive thinking. The document contains the following chapters: 1) introduction--educating 21st century man; 2) the program--IMPACT's schedule of inservice training; 3) the stimulus--theories IMPACT teachers examine, behavioral objectives, discovery learning, simulation and media, productive thinking, effective questioning; 4) communication is the process; 5) response--how teachers apply IMPACT's theories, with selected reports from each of the teams; 6) the measurement--research findings giving evaluations of the project in relation to creativity in the classroom, self-concept of the teacher and self-concept of the student. The evaluation shows that IMPACT is influencing the thinking processes taking place in classrooms, with the possible result of more creative men and women as products of the education system. (See ED 033 906 for 1969 annual evaluation report.) (MBM)

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IMPACT 70

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FOREWORD

This report has been prepared as an unofficial account of the development of Project IMPACT during its second year of existence.

IMPACT is an inservice education project of the Polk County Board of Education.

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PREFACE

Inservice education for teachers has many faces and may come in forms ranging from a year-long course of study in higher education to a twenty-minute lecture session before or after school.

This publication is a report of a year-long inservice education program which culminated in a five-week, teach-and-study institute. Project IMPACT, which has completed its second year of operation, has attempted to delimit the scope of its inservice education program by stressing those educational issues which are believed to have merit for all teachers regardless of grade or subject-matter specialities.

The major goals of Project IMPACT are: (1) to help teachers examine the many variables that influence the humaneness of the classroom, and (2) to investigate with teachers the research and literature which seem to be helpful in bringing into focus the teacher's role in eliciting productive thinking on the part of students.

Project IMPACT represents a cooperative inservice education program linking the resources of local schools, the intermediate unit, and higher education.

Bill M. Clark

INTRODUCTION . . .
educating 21st-century man

"The most pervasive (and unexamined) constant in education is the teacher-pupil relationship. In this an older person imparts to a younger (or less 'educated' person) the cultural wisdom or the skills which the teacher has learned. . . . There are some serious questions whether most of the cultural inheritance of America's past is any longer relevant to the future in which the child will live as an adult."

—Don Fabun

What is the education business all about, anyway? Well, for openers, it's about $65-billion out of the pockets of this nation's taxpayers each year. That makes education America's largest single industry outside of national defense. It involves nearly 60 million full-time students and three million teachers. That's almost one-third of our population.

But education is more, too. Our education system will produce virtually all of tomorrow's business managers, all of industry's employees, all government workers and all our consumers. The simple fact is that all of us are—and will be—strongly affected by the education system.

So what do we get for all our money and all those teachers' and students' efforts? A lot of action, for one thing, much of it violent action. Two out of three principals of city and suburban high schools have reported some form of active student protest, according to a recent survey. The same survey shows, surprisingly, that in the country's rural areas more than half of the high schools and 56% of the junior high schools have reported unrest. This unrest has ranged from walkouts against smoking regulations to arson, personal violence, and vandalism—all in pursuit of a variety of student goals.

Also, according to the Urban Research Corporation, high school protests tend to be more racial in character than college disturbances because of the great number of black students, and therefore the unrest often includes "non-educational" problems.

Congress has not yet involved itself in the junior high and high school problem, but it is currently working on the problem of college violence. According to Congresswoman Edith Green of Oregon, of the more than 60 bills introduced thus far on the subject, 55 would have to be rated "repressive." Most of the repression takes the form of cutting off federal aid to colleges and universities which fail to adopt "acceptable" codes of student conduct.

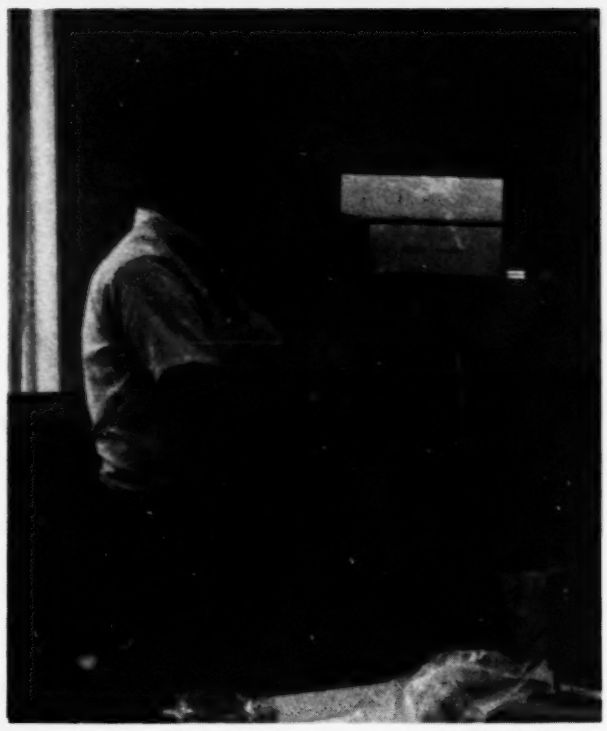
Many thoughtful observers of the education scene, however, believe student unrest arises from something more profound than a lack of proper "rules of conduct" for students.

Peter Marin, for example, in the June 1969 PTA magazine, says concerning the adolescent student, that

> Schools, rooted as they are in a victorian century and seemingly suspicious of life itself, are his natural enemies. They don't help, as they might, to make that bridge between his private and social world. They insist, instead, upon their separation. Indeed,

family, community, and schools all combine—especially in the suburbs—to isolate and "protect" him from the adventure, risk, and participation he needs.

. . . The problem is that our institutions are geared to another century, another set of social necessities, and cannot change quickly enough to contain, receive, or direct adolescent energies—and as we suppress or refuse these energies they turn to rage. Thus the young, in that vivid confrontation with the thrust of nature unfolding in themselves, are denied adult assistance.



How could education have fallen so far behind the times? Dr. Willard Congreve, until recently associate professor of education at the University of Chicago and now Superintendent of Schools in Newton, Iowa, says it's because, "We don't teach the way we were taught to teach; we teach the way we were **taught."** Congreve says he's seen teachers completing their work in Chicago's master-teacher program whose classroom behavior is modeled on how their own seventh-grade teachers taught.

Other educators believe the problem in teacher education may be even worse—that, actually, we still may be **training** teachers to teach like their seventh-grade teachers did.

Dr. Frank E. Williams, a nationally-prominent consultant in teacher inservice education, has used what he calls an "awareness check-list" to see how many teachers are cognizant of various significant research studies. After one nationwide survey using the check-list, Williams reported that, "Upon analyzing the response items . . . it became evident that specific knowledge about more than half of the research studies on modes of thinking of young children and media devices for developing or enhancing creative potential was unknown to this group."

For example, Williams reports, 95% of the teachers surveyed had never heard of psychologist J. P. Guilford's "structure-of-human-intellect" model, a landmark development in the study of how humans think and learn which has been widely published since 1957. Equally discouraging was Williams' finding that 91% of the teachers were unaware of Benjamin Bloom's authoritative "Taxonomy of Educational Objectives," which was first published in 1956.

As one educator said after reviewing the Williams' findings, "it would be no less shocking to find that 95% of the surgeons had never heard of open-heart techniques, or that most general practicioners were unaware of Dr. Salk's polio vaccine."

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But even if teachers were universally aware of the latest findings in educational and psychological research, it is doubtful that their knowledge alone would halt the inward and overt violence in our youth.

Noting that the educational system is, in fact, making a valiant

effort to adapt to our age of rapidly accelerating change, Arthur W. Combs says that

> In all the confusion of probing education, pushing and pulling it into a more appropriate shape for our times, we must remind ourselves again that education is a **people** business in which the goals we seek and the things we try must eventually be judged in terms of the **persons in the process.**
>
> The goal of education must be self-actualization, the production of persons willing and able to interact with the world in intelligent ways. To achieve that end, educators must concern themselves with both halves of the equation: the person and the world, the learner and the subject. Unbalanced concern with either half can destroy the very ends we seek.

"Within a decade or two it will be generally understood that the main challenge to U.S. society will turn not around the production of goods but around the difficulties and opportunities involved in a world of accelerating change and ever-widening choices. Change has always been a part of the human condition. What is different now is the pace of change and the prospect that it will come faster and faster, affecting every part of life, including personal values, morality, and religion, which seem most remote from technology."

—Max Ways

The analyses presented above make it apparent that most of education's problems are traceable to two central concerns. First, educators apparently spend too much time teaching kids to remember subject matter (history, math, science, etc.) when psychological and educational researchers have long since shown that it would be more profitable both for the students and for society if we'd concentrate on teaching students to **think.**

Second, our assumption (usually left unstated) that children are basically bad and must constantly be watched and corrected by wary adults has led to a terribly time-wasting and personally degrading system of regimented education. Dave Edwards, elementary school principal at Mitchellville, Iowa, says that "systems in use at most schools treat all students as though they were irresponsible, even though only a few really have trouble controlling themselves. We need to reverse that approach so that children are allowed to exercise their own self-discipline unless they prove themselves incapable of doing so."

But, assuming this picture of the roots of the problems is an accurate one, what can be done to change it? One thing seems sure: none of the ideas that are claimed to be better than what we're doing now will be adopted unless someone tells **teachers** about them. As Theodore Kaltsounis, Associate Professor of Education at the University of Washington puts it,

> It makes no difference how excited college professors may get about innovations or how many articles they may write for journals that are read by other professors. The real test of educational innovation is to be found in changed teaching practices. The final hope for spreading innovations rests with the teachers' willingness to accept them and with their capability to implement them.
>
> While some teachers are familiar with the innovations and

"When we talk about intelligence, we do not mean the ability to get a good score on a certain kind of test, or even the ability to do well in school; these are at best only indicators of something larger, deeper, and far more important. By intelligence we mean a style of life, a way of behaving in various situations. The true test of intelligence is not how much we know how to do, but how we behave when we don't know what to do."

—John Holt

have been influenced by the new trends, the majority of them are too far behind and frightened by the volume and the rapidity of change. The gap appears to be so enormous that it practically makes no sense to go on with innovations without a parallel and equally rigorous and systematic attempt to bridge this gap.

It is in answering this challenge to bridge the gap between educational research and practice that Project IMPACT finds its role. IMPACT is an inservice education program with a difference. Instead of lecturing to teachers about new developments in given subject matter areas, or bombarding them with information about the latest textbook series, the IMPACT staff involves teachers in a serious examination of the act of teaching.

In this examination, teachers work together in small groups, assisted by IMPACT staff members who have devoted much time and study to significant research on the teaching-learning process and on teaching methods which facilitate that process. The purpose of teachers' looking at this research is to **evaluate** it. Just as doctors and other professionals thoroughly examine every new theory or practice to ensure that it is good for their own clients, IMPACT teachers are encouraged to put the approaches suggested by the researchers to the test to see whether these approaches work for them in their own classrooms.

To perform this sort of evaluation, IMPACT suggests that teachers use two criteria: (1) does the new method or theory you are examining help teach children to think? and (2) does it help humanize the teaching-learning situation?

Several theories and ideas being put forward by educational researchers are discussed in this booklet. These and others are presented to teachers in the course of their IMPACT inservice training. None of them are presented as "the answer." The IMPACT staff believes each of these ideas has merit, but we believe, too, that the teacher is the professional. It is he who must diagnose the educational needs of each of his students and provide for those needs.

It is the teacher upon whom the future of education in this country hinges. IMPACT believes that he must be given every opportunity to examine and evaluate all of the potential tools available to him to build a new structure of education.

This new structure, hopefully, will be one in which children and young adults are treated as what they in fact are—young human beings. It will be a structure in which the value of the various subject-matter disciplines is recognized and cherished, but in which these disciplines also are recognized as a means to an end. And the end, or purpose, of this new structure and all that goes on within it will be to help students to learn to think.

In this, IMPACT has adopted the goal set by the Educational

Policies Commission of the National Education Association, which said in 1961:

> The purpose which runs through and strengthens all other educational purposes—the common thread of education—is the development of the ability to think. This is the central purpose to which the school must be oriented if it is to accomplish either its traditional tasks or those newly accentuated by recent changes in the world.

It is significant that the Commission should mention the effects of "recent changes" on education, for, more than any other single factor, it is the process of change with which educators must learn to deal. Former Secretary of Health, Education, and Welfare, John W. Gardner, stresses this point in his book **Self-Renewal:**

> The pressing need today is to educate for an accelerating rate of change . . . Change is so swift that the "latest thing" today may be old-fashioned by the time young people enter adulthood. So they must be taught in such a way that they can learn for themselves the new things of tomorrow.

The child entering kindergarten today will be in his thirties at the turn of the century. He will be building his career in a field that possibly does not exist today. He will be raising his children in a world we might not recognize.

Forecasters tell us that, for one thing, it will be a world in which one out of every three people is under 15 years of age. It may be a world in which national governments subordinate themselves to an international confederation. It is possible that people may be paid **not** to work and those who do might "commute" to work via closed circuit holography—a process in which laser beams are used to create three-dimensional images. Suburbs might disappear in favor of apartment-type living in self-contained "megastructures" surrounded by parklands. Each person may have his own personal computer to serve as a "second mind" and eliminate entirely the need for memorization of facts.

Or, on the other hand, none of these things may be true. Only one thing is certain—there will be change. Enough change that, from the perspective of the 1970s, it might as well be infinite change.

Fortunately, however, the human intellect has nearly infinite capabilities. It is almost infinitely flexible and capable of amazingly fluent production of new ideas. Man's curiosity, imagination, courage, are apparently infinite. The task facing those who would educate 21st century man is to help him learn to use those nearly-infinite abilities. The IMPACT staff believes that we already have the tools with which to accomplish that task, and they see their task as helping teachers develop a facility in the use of those tools.

THE PROGRAM . . . IMPACT's schedule of inservice training

In attempting to help teachers evaluate the work of the researchers and develop the results of that work into useful tools for their own classroom instruction, the IMPACT staff has employed a variety of means. In this chapter is presented, in tabular form, a listing of the workshops, conferences and meetings conducted by IMPACT between August, 1968 and August, 1969.

The purpose of this listing is to give some indication of the scope of IMPACT's effort to disseminate information and to initiate changes in attitude among the educators of Iowa. The guiding principle in all of these gatherings has been two-fold: (1) the human intellect is capable of more thought, and more kinds of thought, than education has traditionally recognized; and (2) the affective climate of schools at all levels has too often in the past placed restrictions on the intellectual and creative potentials of students.

"We teach a subject not to produce little living libraries on that subject, but rather to get a student . . . to take part in the process of knowledge-getting. Knowing is a process, not a product."

—Jerome S. Bruner

PROGRAMS WITHIN AREA XI

Audience		Number in audience	Number of programs
Administrators			
Oct.	Area Administrators	120	1
Nov. & Feb.	Elementary Principals	25	2
Jan.	Dallas County	12	1
Feb.	Secondary Principals	14	1
March	County Superintendents	12	1
April	Iowa State University	15	1
May	Association for Student Teachers	50	1
May	Mid-Central Elementary Principals	13	1
Total		261	9
Professional Groups			
Sept.	University of Northern Iowa	50	1
Oct.	Association for Childhood Education	175	1
Oct.	Iowa State Education Association	30	1
Jan.	Delta Kappa Gamma	40	1
July	Rotary (West Des Moines)	45	1
Total		340	5
Student Teachers			
April	Iowa State University	40	1
May	University of Northern Iowa	30	1
Total		70	2

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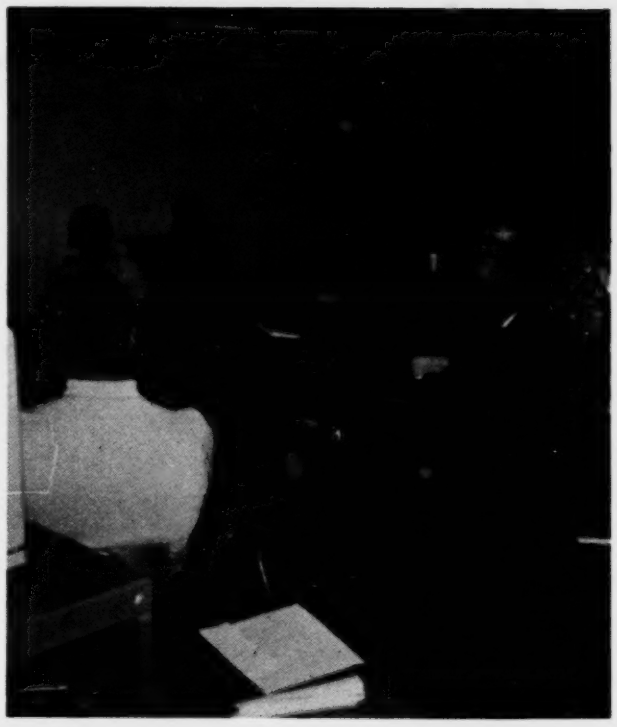


PROGRAMS WITHIN AREA XI (Con't)

Audience		Number in audience	Number of programs
Teacher Inservice			
Sept.	Woodlawn, Des Moines	60	1
Oct., Jan. & Feb.	Jensen & Blackhurst, Urbandale	25	4
Nov.	Valley & Stilwell, West Des Moines	150	1
Dec., Jan., April & May	Mitchellville, Southeast Polk	16	5
Dec.-March	Johnston	65	9
Jan.	Ankeny & Southeast Polk	350	1
Feb.	Phillips, Des Moines	50	1
Feb.	Hillis, Des Moines	40	1
Feb.	Sacred Heart, West Des Moines	20	1
March	Panora-Linden	40	1
March	Oak Park, Des Moines	40	1
March	Des Moines Diocese	80	1
March	Lucas, Des Moines	25	1
March	Menlo	40	1
March	Wallace, Des Moines	25	1
April	Saydel	75	1
April	Central District Meeting	160	1
July	Iowa State University Workshop	50	1
August	Newton Elementary and Secondary Faculties	200	2
August	Dallas Center	25	2
Total		1536	37

	Number in audience	Number
Visitations to teachers		50
Visitations to administrators		19
Demonstration teaching in individual classrooms		15
IMPACT workshops		4
IMPACT summer institute (5 weeks at Stilwell Jr. High)	120	
IMPACT advisory committee meetings		4
Innovatium for Diocese of Des Moines Schools—5 days	50	
Higher education meetings—Iowa State University, University of Northern Iowa, and Drake. Planning for E.P.D.A. proposal		8
Inquiries concerning IMPACT—from 9 states and Canal Zone		29

PROGRAMS WITHIN AREA XI (Con't)

Parent-Teacher Association			
Sept.	Rice, Des Moines	30	1
Jan.	Cowles, Des Moines	25	1
Feb.	Delaware, Southeast Polk	40	1
Feb.	Johnston	25	1
Total		120	4

PROGRAMS OUTSIDE AREA XI

Audience		Number in audience	Number of programs
Programs			
August	Laramie, Wyoming teachers	40	1
Oct.	Creighton University students	30	1
Feb.	Kalona Jr. & Sr. High faculties	40	1
March	Rockwell City Women's Reformatory staff	60	1
April	Council Bluffs teachers	150	1
May	Graceland College, Lamoni	50	1
August	Mason City Jr. & Sr. High faculties	150	1
Total		520	7

IMPACT MATERIALS

	Number of books and films available	Number of people checking out materials	Number of times checked out
Materials			
Library Books	2,112	711	3,031
Films	14	74	93
Total	2,126	785	3,124

Schedule of Dr. Calvin Taylor, IMPACT Consultant

		Number in Audience
February	Simpson College, Indianola, Iowa	
	Lectured: Psychology Class	30
	Student Teachers	30
	Faculty	15
	Indianola Public Schools Faculty	60
February	Iowa Wesleyan College, Mt. Pleasant, Iowa	
	Lectured: Student Teachers	75
	Adult Lecture	60
March	Central College, Pella, Iowa	
	Lectured: Student Teachers	55
	Individual Conferences	3
March	University of Northern Iowa, Cedar Falls, Iowa	
	Lectured: University Faculty	25
	Training School Faculty	40
April	Iowa State University, Ames, Iowa	
	Lectured: Faculty	8
May	University of Iowa, Iowa City, Iowa	
	Lectured: Graduate Students	12
	Faculty	25

" The brain which underlies the mind is far, far too complex for us to hope that all of its intellectual activities can be represented by only a single score or by a handful of dimensions."

—Calvin W. Taylor

THE STIMULUS . . .
theories IMPACT teachers examine

"The pressing need today is to educate for an accelerating rate of change. . . . Change is so swift that the "latest thing" today may be old-fashioned by the time young people enter adulthood. So they must be taught in such a way that they can learn for themselves the new things of tomorrow."

—John W. Gardner

In the previous chapter are listed the workshops, inservice sessions, visits and meetings conducted by the IMPACT staff in the course of their inservice education program for teachers. The objective in all of these efforts is change of attitude toward the teaching act.

But what theories and concepts do the IMPACT staff members and the participating teachers discuss that will help them take another look at teaching and allow them to develop new, more productive attitudes toward their work? A great variety of things, of course, running the gamut from communication theory to Cuisenaire rods, from productive thinking to video tape recording. Basically, however, the prime concentration is on those theories and ideas which concern the way teachers and students **behave** while interacting with one another in the classroom.

The five-week IMPACT Summer Institute conducted at West Des Moines' Stilwell Junior High School is the most comprehensive effort undertaken by IMPACT staff and teachers during the past year, and it provides perhaps the best example of the types of subject matter discussed in all IMPACT sessions.

In the five following sections of this booklet, IMPACT staff members describe subjects they discussed with Summer Institute participants in the afternoon seminars at Stilwell (the mornings were devoted to practice-teaching sessions, in which some 500 students in grades 1-12 cooperated).

BEHAVIORAL OBJECTIVES

Bill M. Clark, Ph.D.

In essence, a behavioral objective is the teacher's specification of a desired observable, measurable student behavior at the end of a designated period of instruction. A number of IMPACT Summer Institute participants chose to study a sample of the literature pertaining to behavioral objectives. The basic materials examined by this group were: (1) **Preparing Instructional Objectives,** by Robert Mager, (2) **Developing and Writing Behavioral Objectives, by** Robert Armstrong, et al., (3) **Developing Attitude Toward Learning,** also by Mager, and (4) tapes and filmstrips on behavioral objectives prepared by W. J. Popham and Eva L. Baker and produced by Vimcet Associates, Inc.

Since the overriding theme of the Summer Institute was humanizing the learning process and teaching for productive thinking, behavioral objectives seemed somehow out of place. It was difficult to see how they belonged in a situation where discovery learning, productive thinking, and interpersonal communications were to be the student behaviors most emphasized. At least at first glance, there seemed to be too much rigidity implied in behavioral objectives theory.

Unanswered Questions

The study therefore understandably got underway with more questions raised than could possibly be answered in the five-week period. Some examples:

What are the differences in the terms "behavioral objectives," "instructional objectives," and "performance objectives?"

"Actually, it's not important for us to spend a great deal of time evaluating other people. What's very necessary is that we spend time evaluating ourselves and that we set up our schools so that children can spend a great deal of time evaluating themselves. It's not what other people say of you that's terribly important; it's your impression of yourself, relative to others and to everything else."

—William E. Glasser

How do you develop behavioral objectives in the "affective" behavioral domain?

Do teachers have time to write objectives for every lesson and every class?

How can we individualize instruction if we don't individualize behavioral objectives?

If teachers assume that all student behavior should be measured, won't individual imagination and originality be stultified?

Behavioral objectives are probably applicable to mathematics and science, but how do they fit into the humanities?

These questions represented the typical IMPACT teacher's reaction to the "objectivity" suggested by the use of measurable, behavioral objectives. At the same time, however, many of the teachers saw the need for more specificity in outlining units of study and what each is supposed to accomplish, even though they believed the time-consuming task of preparing written objectives would be overwhelming.

Some Generalizations

After examining Mager's materials and Popham's filmstrips and practicing writing objectives in several content areas, the group of IMPACT teachers came to several general conclusions, some positive and some negative:

Positive

1. Teachers need to develop standards of terminal behavior, i.e., to define what kinds of behavior students should be able to perform at the end of a class or a year of study.
2. Teachers need frequent feedback which will help them to assess the effectiveness of their instruction.
3. Behavioral objectives can be helpful in reducing the amount of "random" teaching.
4. The literature and research pertaining to behavioral objectives are helpful to teachers in understanding and interpreting observable student behavior.

Negative

1. Writing behavioral objectives is too time-consuming for most teachers.
2. When using behavioral objectives, originality and imagination on the part of students can easily be stifled.
3. Behavioral objectives may have a tendency to dehumanize the classroom climate.
4. Behavioral objectives are applicable to vocational subjects and "skill" lessons, but are difficult to implement in "academic" areas.
5. Most of the work done thus far in behavioral objectives research specifies only trivial cognitive student behavior, ignoring vast areas of thinking ability and the entire spectrum of affective behavior.

Ready-Made Objectives

The prevailing teacher attitude on behavioral objectives seems to be that talking about them is easier than implementing them in the classroom. Another, more specific attitude at least among the Summer Institute teachers, concerned the development of "behavioral objective banks."

There are those advocates of behavioral objectives, it seems, who have developed "recipe books" of behavioral objectives for any desired content area. These publishers admit that the time needed to prepare behavioral objectives presents a problem for most teachers, so they "solve" that problem by serving up ready-made objectives for teachers in any subject-matter and at any grade level.

This remote-control approach to behavioral objectives was disturbing to many of the seminar participants. An attempt by the classroom teacher over a period of several years seemed to them to be more worthwhile than relying on some outside agency.

The over-concern with content in most of the behavioral objectives literature was likewise bothersome to the teachers. Education needs to focus on affective as well as cognitive behavior. Behavioral objectives researchers thus far have stressed, out of all proportion, the importance of cognitive behavior. This approach to education has tended to reduce the student to the level of a vessel to be filled with pre-digested knowledge and has overlooked the human side of the education equation.

Behavioral Objectives Bibliography

Bloom, B. (Ed.). **Taxonomy of Educational Objectives, Handbook I: Cognitive Domain.** New York: David McKay Co., Inc., 1956.

Eisner, E. W. "Educational Objectives: Help or Hindrance?" **School Review,** LXXV (1967), 250-266.

French, W., **et al. Behavioral Goals of General Education in the High Schools.** New York: Russell Sage Foundation, 1967.

Gagne, R. W. The Analysis of Instructional Objectives for the Design of Instruction. In R. L. Glasser (Ed.), **Teaching Machines and Programmed Learning, II, Data and Decisions.** Washington, D.C.: Department of Audio Visual Instruction, National Education Association, 1965, 21-65.

Krathwohl, D. R. The Taxonomy of Educational Objectives—Its Use in Curriculum Building. In C. M. Lindvall (Ed.), **Defining Educational Objectives.** Pittsburgh: University of Pittsburgh Press, 1964.

Krathwohl, D. R., Bloom, B., and Masia, B. **Taxonomy of Educational Objectives, Handbook II: Affective Domain.** New York: David McKay Co., Inc., 1964.

Mager, R. F. **Developing Attitudes Toward Learning.** Palo Alto, California: Fearon Publishers, 1968.

Mager, R. F. **Preparing Instructional Objectives:** Palo Alto, California: Fearon Publishers, 1962.

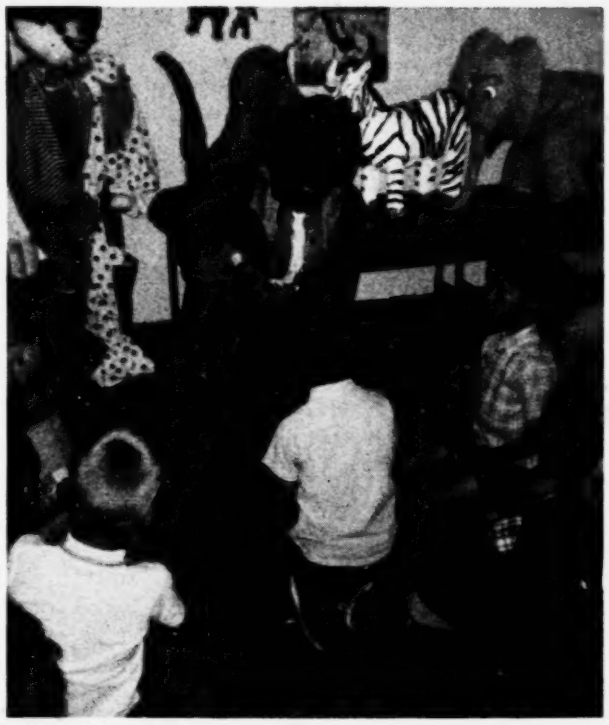
Popham, W. J. "The Performance Test: A New Approach to the Assessment of Teaching Proficiency." **The Journal of Teacher Education,** XIX (1968), 216-222.

Popham, W. J. and Baker, E. L. "The Instructional Objectives Preference List." **Journal of Educational Measurement,** II (1965), p. 186.

Sanders, N. M. **Classroom Questions: What Kinds?** New York: Harper & Row Publishers, Inc., 1966.

Tyler, R. W. **Basic Principles of Curriculum and Instruction.** Chicago: The University of Chicago Press, 1950.

Vimcet Associates. Filmstrip and Tape Kits; 18 programs prepared by W. James Popham and Eva L. Baker. Los Angeles: 1966.



DISCOVERY LEARNING

Helen Coe, M.S.

A Definition

Discovery learning is, as its name implies, learning through discovery—on your own, participating in discovering ideas and relationships for yourself.

A discovery-oriented classroom calls for changes in the traditional roles of both the teacher and the student.

The Teacher's Role

—The teacher's responsibility becomes that of planning a sequence of learning activities around basic concepts, ideas, topics, and generalizations the students want to explore.

—The teacher provides the initial springboard which he carefully prepares to cause perplexity.

—The teacher continuously operates upder the assumption that the student is capable of thinking for himself.

—The teacher sustains interest in the topic through:

a. redirecting students' questions to sources other than himself,
b. prodding students to explore and test new alternatives,
c. summarizing and asking for clarification of students' statements, and
d. raising additional questions.

—The teacher legitimizes and rewards free exchange and the testing of new ideas in the classroom. This sort of exchange takes place in a dialectical format between student and student, rather than between student and teacher.

—The teacher no longer exercises a monopoly over class discussions and is no longer the "accepted authority."

The Student's Role

—Though students are often insecure and frustrated when first allowed to think for themselves in the classroom, they begin to value the opportunity to learn how to learn—to understand what Jerome Bruner calls the "hueristics" of learning. When confronted with a problem, they find they do in fact possess the skills needed to explore the problem.

—Students begin to view knowledge as tentative rather than absolute. This attitude is reinforced by the teacher, who encourages students to critically evaluate ideas presented to them.

—Sudents gradually incorporate what is learned into their own personalities. Individual thought processes do not move in any set order. The learner often makes false starts, races up blind alleys, then leaps, skips steps, takes shortcuts. This precludes the concept of a single program for all students. As Leslie A. Harts says in a recent **Saturday Review** article, "To search for a **sequence** that will 'fit better' is futile—one might as well hunt for a single garment that will 'fit better' on all the children."

Why Discovery Learning?

Because preparing the student to solve social and intellectual problems on his own will hopefully better equip him to solve inevitable problems in his own life.

Because open discussion in class should unleash human capabilities in students which have remained dormant in our traditional classrooms.

Because being responsible for his own learning has highly motivating effects on student learning behavior.

The Relationship to IMPACT

The twenty-three teachers who explored the literature and carried on group discussions during the IMPACT Summer Institute found that the teacher's role in discovery-oriented learning leads to the creation of a new psychological climate in the classroom. The teacher is no longer a "sage on the stage" but becomes a "guide on the side," thus moving toward one of IMPACT's two major goals — humanizing education.

They found, too, that the student's role in discovery learning prepares him for becoming an autonomous learner—one who can satisfy his own needs for information, understanding and intellectual stimulation. He develops an image of self-capability and individual accomplishment. He is a product of a learning environment which allows for and enhances his own thinking—an environment which encourages achievement of IMPACT's other goal, teaching for thinking.

Discovery Learning Bibliography

Bower, Eli, **et al. Behavioral Science Frontiers in Education.** New York: John Wiley & Sons, Inc., 1967.

Dunfee, Maxine and Sagl, Helen. **Social Studies Through Problem Solving: A Challenge to Elementary School Teachers.** New York: Holt, Rinehart & Winston, Inc., 1966.

Fair, Jean and Shaftel, Fannie. **Effective Thinking in the Social Studies.** Washington, D. C.: National Council for the Social Studies of the National Education Association, 1967.

Massialas, Byron G. and Zevin, Jack. **Creative Encounters in the Classroom.** New York: John Wiley & Sons, Inc., 1967.

Michael, William B. **Teaching for Creative Endeavor.** Bloomington; Indiana University Press, 1968.

Shulman, Lee S. and Keislar, Evan R. **Learning by Discovery: A Critical Appraisal.** New York: Rand, McNally & Co., 1966.

"It now seems possible that many things can be learned in creative ways more economically and effectively than by authority. It appears that children can be taught in such a way that their creative thinking abilities are useful in acquiring even the traditional educational skills, that these abilities are different from those measured by intelligence and scholastic aptitude tests, and that they are important in mental health and vocational success."

—E. Paul Torrance

SIMULATION AND MEDIA

Frank W. Broadbent, Ph.D.

Teachers in the simulation and media seminar concentrated on the uses of computers, film and video tape systems, and gaming materials to assist them in achieving the goals of Project IMPACT.

In each of these areas, it was anticipated that teachers would (1) develop a basic competence in operating the equipment, (2) research a variety of reference materials to assist them in understanding the media and in implementing media use in their schools, (3) discuss the current uses of and new possibilities for the media in education, and (4) develop a capability in the use of the media in actually working with students.

Twenty-six teachers participated in the seminar during the summer institute's afternoon sessions. Almost immediately, the participants divided into subgroups according to their respective interests. Soon, each subgroup was involved in its own project.

"Education has not yet caught up with the fact that the educational pattern of the past, in which it was assumed that the old know and the young must learn is no longer valid. We are teaching young people to respect authority at a time when authority is no longer possible, and when we ought to be struggling together to understand the world in which we live. We still say to them, listen and learn, rather than strive with us."

—Robert Theobald

Several of the participants took advantage of a unique opportunity presented during the Institute. Project ACCESS, a computer-service program operated by the Polk County Board of Education, set up three computer terminals at Stilwell. Instruction for teachers and students in the BASIC computer language was provided by ACCESS staff members and by Mr. Dean Crocker of the Iowa State Department of Public Instruction.

Impressive results came from this effort almost immediately. One teacher turned his classroom into a simulated computer, with the students playing the roles of the various components, to illustrate how a computer operates.

Two other teachers developed an earth-science program in leaf identification. Programs were developed, among other things, for the mixing of colors, uses of the various parts of speech, and playing "blackjack." All of these efforts led teachers and students to a deeper understanding of computer-assisted instruction.

Possibly the most sophisticated program was developed by a science teacher. In an ecological program, he simulated the interrelatedness of the population of rabbits in a given area, the amount of grass available, and the population of hawks. As the grass availability increased, so did the rabbit population, and consequently, the hawk population. The over-loading of the ecological system with too many rabbits, however, would cause a decrease in the grass-food supply, and subsequently a reduction in both rabbits and hawks. His program could give an instant readout of developments at any specified time in the ecological cycle.

The enthusiasm of these teachers was contagious. Soon many other teachers and students—although not working in the simulation/media seminar—were "hooked" on computers. One classroom played a simulation game called NATION. Students took on roles as heads of state, foreign ministers and economic advisors, making decisions in an effort to better their political and economic fortunes on the international level.

But the computer-assisted instruction enthusiasts were not the only subgroup to generate excitement. Another took on the theories of Marshall McLuhan. They attempted to interpret McLuhan's "medium is the massage" philosophy by studying the uses of various media in the classroom particularly in terms of the effects each medium has on teachers and students.

As with any group that would consider McLuhan's purposefully disjointed philosophy, the teachers in this case needed long hours of wrestling with strange ideas and with old ideas viewed from strange angles. Their answer to the question of the media's effects on educaion was appropriately McLuhanesque. They presented it to their fellow teachers in multi-media presentation form, and stated it not as an answer, but as another question: "Want to buy a good schoolhouse cheap?"

The art of animation and teacher or student-produced films interested a third subgroup of seminar participants. They produced an animated film based on the "Three Little Pigs" nursery rhyme, with an instructional message for young children. And, like the McLuhan subgroup, they delved into the study of the media and reflected seriously upon the need for "visual literacy" in the modern school.

Three teachers in still another subgroup concentrated on the uses of the videotape recorder (VTR) in the school. Armed with both a large table-model VTR and a small portable model, they began by

mastering the mechanical aspects of the medium. Then they set out to produce a documentary videotape of their own. They also looked into such varied applications of VTR as "micro-teaching," student dramatic productions (students learn effectively by watching their own rehearsals), and the recording of commercial television programs for replay in the classroom.

The final—and largest—subgroup in the seminar tackled the uses of simulation theory in education. At heart, a simulation is an action-model of a social system. Players in the simulation normally take on the roles of decision-makers in the modeled system so they can learn how decisions are made and also what effect their decisions have upon the system and other players.

After a period of exploration of games and simulation materials, this subgroup launched into the creation of their own simulation games. In addition, commercially-produced games such as **Propaganda** and **Equations** found their way into the classrooms where participants taught in the morning institute sessions.

The seminar on simulation and the media was a "hands-on" experience, and it achieved the goals for which it was designed. Because everyone involved maintained an open-minded attitude and a willingness to "try it once," the seminar progressed well beyond the gadgetry and technology stage to a point where teachers could actually use the media to express their own humanity.

Hopefully, during the current academic year the participants in the seminar are helping many students to express themselves through these same media.

"I know you believe you understand what you think I said, but I am not sure you realize that what you heard is not what I meant."

—Harriet Parker

Media/Simulation Bibliography

McLuhan, Marshall. **Understanding Media: The Extensions of Man.** New York: McGraw-Hill Book Co., 1966.

McLuhan, Marshall and Fiore, Quentin. **The Medium is the Massage, An Inventory of Effects.** New York: Random House, Inc., 1967.

Mastrude, Roger G. **Dangerous Parallel; Decision and Consequences in a World Crisis.** Chicago: Scott, Foresman & Co., 1969.

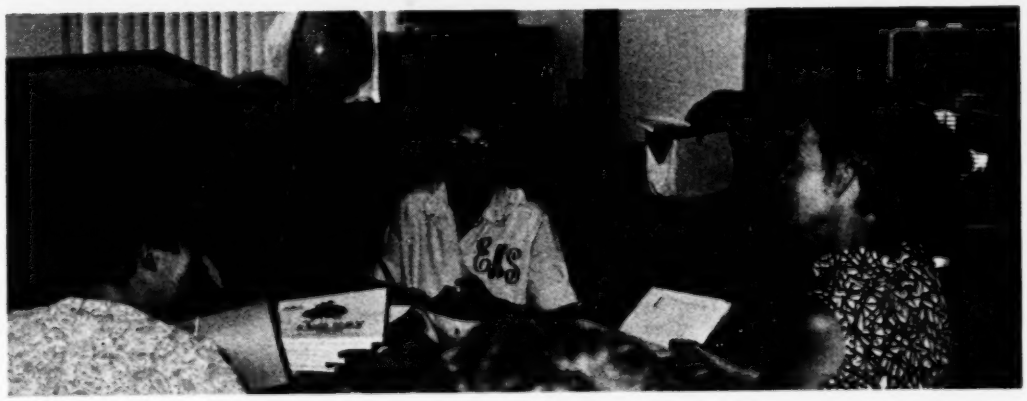
Allen, Laymen E. **Equations.** New Haven: Wff'n Proof, 1967.

Allen, Laymen E. **Wff'n Proof, The Game of Modern Logic.** New Haven: Wff'n Proof, 1962.

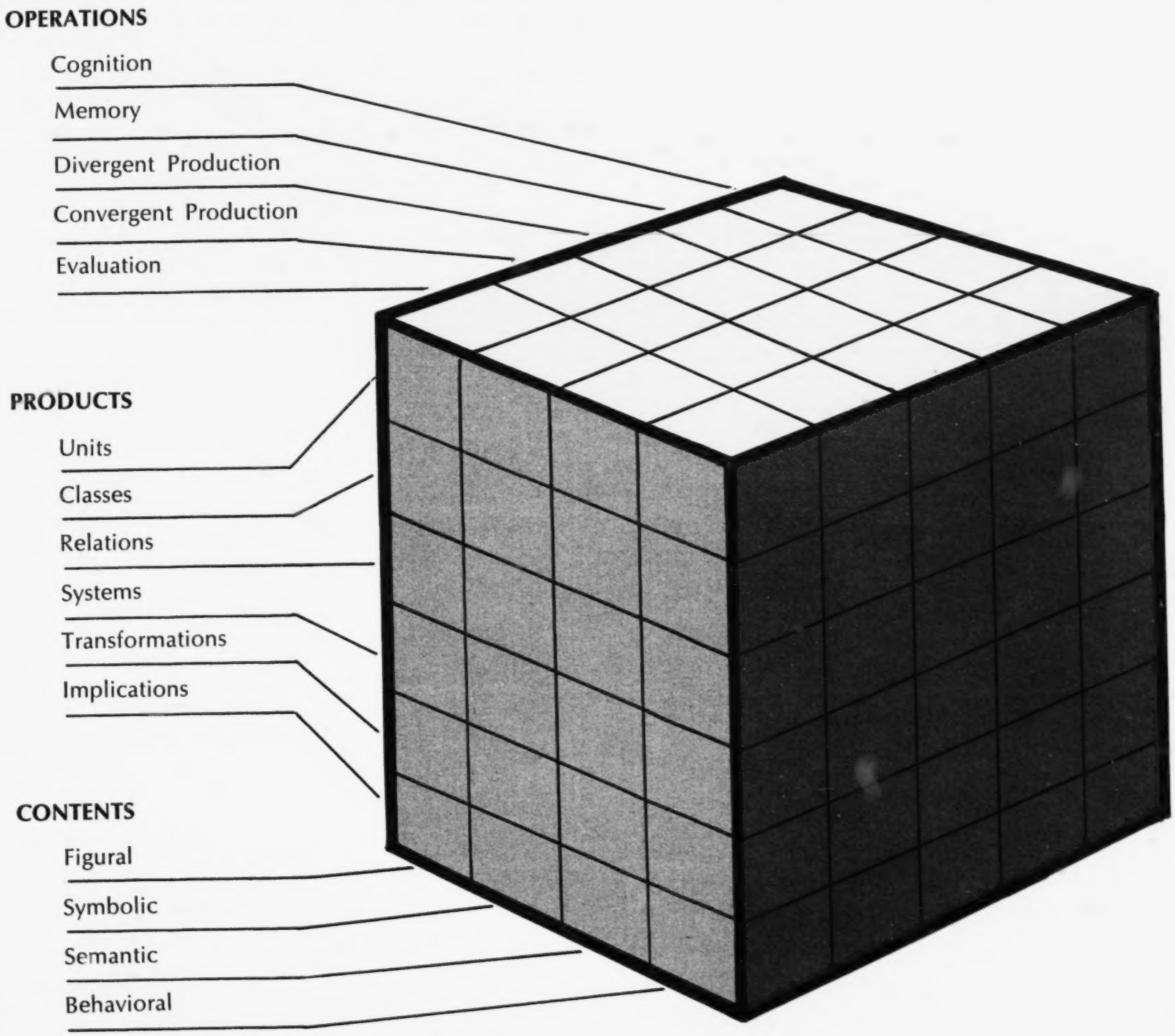
Allen, Robert W. and Greene, Lorne. **The Propaganda Game.** New Haven: Wff'n Proof, 1966.

Luskin, Bernard J. "Computers Prominent in Changed Profile of Education." **Computerworld,** III (October 22, 1969).

"Computer-Assisted Instruction." **IBM Research Reports,** II (January, 1966).



Guilford's Model of the Structure of Intellect



PRODUCTIVE THINKING

Joseph P. Rowson, M.S.

"Most social commentators call this the age of symbol-manipulation. In our grandfathers' day, most people earned their living by manipulating things, not by manipulating symbols. Men got ahead if they could forge a better horseshoe, harvest a better crop, build a better mousetrap. Communication was, of course, important then, too, but it was less relevant to a man's career."

—David K. Berlo

Perhaps the most chronic complaint that educators hear from businessmen, industrialists, and professional men—the employers of the student we graduate—is that "they can't seem to think for themselves." One prominent engineering department director recently declared that he figured it took the average newly-graduated engineer "at least one year to do anything original."

Generally, these employers are asking that our students be able to accomplish three types of thinking: "Critical Thinking," "Creative Thinking," and "Planning." Twenty-two IMPACT teachers participated in the Summer Institute seminar devoted to an examination of these types of thinking and ways in which sudents can be prompted to think in these ways.

They began with the work of Dr. J. P. Guilford, currently of the University of Southern California, of which the major component is his famous "Structure of Intellect" model. It is a complicated model—a cube divided into 120 cells, each of which represents one potential type of human thought. It is not necessarily the "best" or the "right" way to classify all human thinking, but it has some distinct advantages.

First, as Robert Wilson has put it, "It may serve as a reminder of the great richness and diversity of human thinking abilities and help to keep the teacher from concentrating on too narrow a range of thinking skills in the classroom. Secondly, the description of the nature of the thinking skills may stimulate new ideas for classroom practice as the resourceful teacher turns more attention to the development of some of the important thinking skills which have been relatively neglected in the past."

At heart, Guilford has said that humans think in five ways, which he calls "cognition," "memory," "convergent-thinking," "divergent-productive thinking," and "evaluative thinking."

Man uses these five thinking operations, says Guilford, to think about four general types of content, which he terms "figural," "symbolic," "semantic," and "behavioral." And, by thinking in the five ways about the four types of content, Guilford declares, man develops six kinds of thought-products: "units," "classes," "relations," "systems," "transformations," and "implications."

If you multiply the five thinking operations, by the four contents, by the six products, the result is 120—which is how Guilford came to predict that there are 120 ways of thinking (the "richness" of human thought Wilson mentions).

Guilford has spent the past 20 years or so attempting to verify that human beings in fact do use all 120 of these thinking abilities. He has yet to complete the job (he's verified about 90 at this point), so the teachers in the seminar could hardly expect to finish the job in five weeks.

They did, however, develop some basic understandings of the Guilford conceptualization of human intellectual activity. Some of their findings are listed below:

Cognition

Cognition, according to Guilford, is simple comprehension. Humans apply it to the thinking-contents to produce thinking-products in some of the following ways:

(a) Units—Recognition of syllables in a word, knowledge of the meaning of a word; visual and auditory unit-recognition.

(b) Classes—The ability to recognize classifications of objects or ideas; to know that "automobile," "orange," and "robin" do not belong in the same group.

(c) Relations—Discovering relationships among objects, symbols and conceptual material; to recognize that a group of words have been placed in alphabetical order.

(d) Systems—The ability to arrange objects in space, to discover patterns or systems among symbolic elements; what Wilson calls "general reasoning"—the ability to structure a problem in preparation for solving it.

(e) Transformations—The ability to visualize what would happen to an object if it were transformed in some way; e.g., to be able to "see" what a piece of paper which has had a hole punched in it while folded will look like when it is unfolded.

(f) Implications—Discovering or recognizing implications; the ability to foresee a possible outcome of a present situation indicates cognition of implications. An electrician setting out to wire a home would need this sort of ability, as would a surgeon about to perform an operation.

Memory

In his factor-analysis approach to examining human intellect, Guilford has discovered that our common perception that a person has a "good" or a "poor" memory is fallacious. In fact, he says, there are at least eight kinds of memorization ability: (1) visual memory, (2) auditory memory, (3) memory-span, (4) memory-for-ideas (both 3 and 4 are abilities for remembering substance or content), (5) rote memory, (6) meaningful memory (5 and 6 are abilities to remember associations), (7) memory for spatial order and (8) memory for temporal order (7 and 8 are abilities for remembering systems).

Convergent Thinking

Convergent thinking is the ability to find the "right" answer—the answer which is more-or-less determined by the information given. As Wilson says, "This kind of thinking often is encouraged in the classroom in situations where the teacher has a particular answer to a question in mind and urges the students to come up with it." It, too, is applied to content to develop products:

(a) Units—Like cognition in dealing with units, convergent thinking in units is of a low order. The ability to correctly distinguish forms (circles, squares, etc.) is an example. Another is the correct application of a name to a concept represented by a group of words.

(b) Classes—The ability to categorize words or ideas. An example would be to divide a list of words into prescribed unique categories.

(c) Relations—In this category, the individual is given one or more examples of a given relationship and then is asked to produce correctly a similar example. An example would be to correctly add the next two letters to the series A R B R C R D — —.

(d) Systems—The ability to place things in their most appropriate or reasonable order. Test items which ask the student to place events in logical order are an example of this. It

must rain before it floods; it must flood before the highways overflow, and they must overflow before traffic is halted, e.g.

(e) Transformations—This ability requires that the individual rearrange objects or elements into a new form—but still to come up with a single right answer. For example, the student might be asked which of the following three objects might be useful for transportation on the moon: a box of matches, a parachute silk, a .45-caliber pistol. The correct response could be the pistol, since firing it would propel a man across the moon's surface.

(f) Implications—The ability to "draw correct conclusions." The talent to rigorously follow certain set procedures to arrive at particular inferences or conclusions. This method of thinking is often called "deductive," and has been important in such disciplines as arithmetic and logic.

"The record shows that student demonstrations are part of the current school scene in both slum and suburb. The mechanism is spreading. The administrator who says it can't happen in his system is as naive as those administrators who were saying, just a few years ago that teacher militancy would never catch on."

—Nation's Schools

Divergent-Production

Whereas the convergent thinker seeks a single, correct response, the divergent-productive thinker seeks a diversity of answers in a situation where more than one answer is acceptable or desirable. And, like cognition and convergence, it can be subdivided in terms of products.

(a) Units—In dealing with units, this concept of "ideational fluency" is important. This is the ability to call up many ideas in a situation Wilson calls "relatively free from restrictions, where quality of response is unimportant." An example of a task requiring ideational fluency might be, "list all the objects you can think of that are both solid and edible."

(b) Classes—"Flexibility" is the key concept in the divergent-production of classes. The person who responded to the above test item by naming only vegetables would be said to be lacking in flexibility. The person who shifted classes or categories of objects often in making his list would be said to be high in flexibility.

(c) Relations—Since relationships necessarily involve two or more concepts in some sort of association with one another, "associational fluency" is the key phrase here. The ability to produce many synonyms or antonyms rapidly would be one example.

(d) Systems—Divergent-production in the "systems" category involves "expressional fluency," the ability to produce organized, continuous discourse. It is the ability which enables one to make apt, colorful speech.

(e) Transformations—This is the ability to be original, to produce the clever or at least uncommon response by seeing remote associations or relationships. Seeing consequences others do not, for example, in answering questions such as, "What if all national boundaries were suddenly eliminated?"

(f) Implications—Wilson describes one example of divergent production of implications as "semantic elaboration." This is the ability "to supply details that contribute to the development of or the variations of an idea." A person possessing this ability could easily fill in the details of a briefly outlined plan.

Evaluation

To evaluate is to determine the correctness or the acceptability ("goodness") of a proposition or a conclusion. Like the others, Guilford considers it applicable in all content areas and across the range of thought-products.

(a) Units—This skill is exemplified in the work of the proofreader or the accounting clerk. It is the ability to determine the "correctness" of given symbols or figures.

(b) Classes—The ability to make judgments concerning the most appropriate classes or categories in which to place numbers, letters or signs. Students learning arithmetic might be given a sheet of numerals and asked to choose which ones could be placed in the "even" category, or which could be placed in the "tens" category. This would require them to use evaluative thinking in classes.

(c) Relations—Deciding whether something is "logical" is a relations evaluation. Does a given conclusion follow from a given set of premises? To answer this question, the student is required to be able to evaluate the relations between the statements. In systems of symbolic logic, such as algebra, the thinker must be able to evaluate the relationship of one symbol to others and decide whether an equation or symbolic statement is "right."

(d) Systems—This is the ability to judge whether a situation is internally consistent. The thinker observes an event or series of events and decides whether there are inconsistencies or incongruities in it, thus deciding whether all the elements "fit" into the system being observed.

(e) Transformations—As a person moves from one day to the next and from one situation to the next, he often finds himself in a "data-poor" or ambiguous position. The making of judgments as to the proper course to follow in these cases is often called "common sense." It requires the thinker, in effect, to evaluate transformations.

(f) Implications—The ability to sense when a problem is present; the awareness that there are defects or deficiencies in a given environment of whether things are as satisfactory as they appear on the surface is a much-needed human thinking ability. It is the ability which allows a man to judge the implications of a present situation in terms of their "rightness" or "wrongness."

Even the rather cursory look that the teachers took at the Guilford model convinced them that human thought is a more complicated thing than educators often seem to presume. They also concluded that the predominant, narrow view of human intellect as consisting almost entirely of memorative and cognitive abilities is one reason for the complaints of employers that our students are not creative, critical, and good at planning.

To be a "creative thinker" one must be able to develop a multitude of possible solutions to a problem, establish criteria, and select the most appropriate solutions from the array. This certainly requires memory and cognition, and it is, ultimately, an exercise in convergent production. But the necessity to perform divergent think-

ing—ideational fluency, spontaneous flexibility, originality and elaboration—while not as obvious, exists nevertheless.

The question remains as to whether our school curricula give students exercises which help them develop these abilities.

As for critical thinking, our course objectives have long stated that we want to develop "critical thinking skills." Guliford would call this evaluative thinking, particularly in seeing the implications present in a situation and seeing their rightness or wrongness. To do this, however, students must develop skills in setting their own criteria for making such judgments. And, criteria are established by discovering principles, generalizations, and relations which requires that the student consider a wide variety of situations and relationships—they must do divergent thinking. Divergent-production and evaluation are essentials in critical thinking, and, once again, we are faced with the question as to whether we consciously train students in these thinking skills.

Finally, planning, which is important to successful working (and successful living in general). Planning is a term we use all the time, but which is not easily defined. Certainly it involves foresight, which requires seeing the full range of alternatives available, the consequences (implications) of the alternatives, and the making of judgments as to which alternative course of action leading into the future is most "reasonable" or appropriate. Needless to say, divergent and evaluative thinking operations, in addition to memory, cognition and convergent-production are essential in the planning process.

The need pointed to by Guilford's mammoth undertaking, then, is not so much that every teacher ought to know the 120 human thinking abilities and how each is performed, or even that he be aware of richness of the intellect, but that he make an effort to set situations in which students are given an opportunity to actually develop the entire range of their intellectual potential.

How does the teacher do this? Those in the IMPACT Summer Institute found a variety of ways. There are the "teaching strategies" for divergent-production developed by Dr. Frank Williams, the classroom questioning techniques described by Norris Sanders, the teaching-learning activities designed by Louis Raths and his colleagues, the creative problem-solving techniques of Sidney Parnes and the "synectics" method described by William J. J. Gordon, to name just a few. All of these and many other works are available to teachers who not only recognize the great richness and diversity of the human intellect, but are determined that this knowledge shall have a profound effect on the way they teach.

"Nothing can be done without hope and confidence."

—Helen Keller

Productive Thinking Bibliography

Gordon, William J. J. **Synectics.** New York: Harper & Row, Publishers, 1961.

Guilford, J. P. **The Nature of Human Intelligence.** New York: McGraw-Hill Book Co., 1967.

Parnes, Sidney J. and Harding, Harold F. **A Source Book for Creative Thinking.** New York: Charles Scribner's Sons, 1962.

Raths, Louis E., **et al. Teaching for Thinking.** Columbus: Charles E. Merrill Publishing Co., 1967.

Sanders, Norris M. **Classroom Questions: What Kinds?** New York: Harper and Row, Publishers, Inc., 1966.

Williams, Frank. **Creativity at Home and in School.** St. Paul: Macalester College, 1968.

Wilson, Robert. "The Structure of the Intellect." **News of NEA's Project on the Academically Talented,** II (February, 1961).

EFFECTIVE QUESTIONING

Jack P. Sims, Ed.S.

The use of questions is one of the most popular strategies used by classroom teachers. Traditionally, questions have been used mostly to determine what the student has learned—they require the student to repeat an answer he has memorized. And, like teachers, textbooks also have concentrated mainly on memory-type questions.

In the light of Guilford's research (described above), many IMPACT teachers have pondered whether classroom questions might not be used to elicit other types of thinking behavior in students. About twenty-five teachers in IMPACT's Summer Institute undertook to investigate this area. Their basic conclusion: teachers can use a variety of questioning techniques to encourage students to use divergent and evaluative thinking and thus broaden the intellectual range in the classroom.

There is a "problem" associated with questions which require divergent thinking, of course, namely that the wide variety of responses will quite often include some unusual and sometimes embarrassing answers. There is no way to prevent this and the teacher who would undertake to use these types of questions must have self confidence enough to accept all logical and relevant answers even if they are a bit unusual. He must do this if he expects students to have enough self confidence to go beyond the cognitive-memorative range of thinking and grasp for a range of alternative answers.

The IMPACT teachers who investigated the effective questioning area found that a good first step in broadening the range of questions is to develop a facility for classifying questions. The sample chart below is one tool they developed for clarifying the types of questions used in any classroom.

TYPE OF QUESTION

Classroom Situation	**Memory**	**Cognition**	**Convergent**	**Divergent**	**Evaluative**
Lecture					
Textbook Reading					
Class Report					
Test Review					
Individual Student Report					
Discussion					

By simply taking a moment to look back over a classroom study unit or to review the lesson plan used in a unit, the teacher can give himself a quick tally of how broad a range of thinking his questions are prompting.

In addition to the question-typology chart, the teachers developed several techniques which make for more effective questioning, many of them based on original research by the Far West Laboratory for Educational Research and Development. Some of these are:

(a) Pause after the question is presented to the students. This gives the students time to think and will encourage them to more complete responses.

(b) Use verbal prompts, such as "Please think over your answer carefully."

(c) Listen carefully to what the student says and compare his response with what you expected as a response. If it does not meet the acceptable criterion, ask him to amplify his response. If it is acceptable, be sure to reward him by telling him it is a good answer.

(d) Avoid negative statements about incorrect answers. Allow the student an opportunity to correct his incorrect response and if only part of the answer is wrong, reinforce the part that is correct and help him modify the incorrect part.

(e) Increase the amount of pupil participation—direct the same question to several students at once and don't constantly repeat and rephrase it. This reduces teacher-talk and increases student-talk.

(f) Use questions which have a number of alternative answers and which are likely to involve large differences of opinion so that no single student can supply a definite answer and shut off the flow of response.

(g) Allow students to react to answers of fellow students and to embellish them with their own ideas to develop more complete answers.

(h) Help students clarify their answers by asking them to "state your answer another way," or "could you add something to that to help me understand it better?"

(i) "Refocus" responses to add relevance to the lesson. For example, when students have responded to a question as to why the South used slaves prior to the Civil War, ask them to relate those responses to some of the arguments being used in the current civil rights conflict.

Effective Questioning Bibliography

Aschner, M. J. McCue. "Asking Questions to Trigger Thinking," **NEA Journal,** L (1961), 44-46.

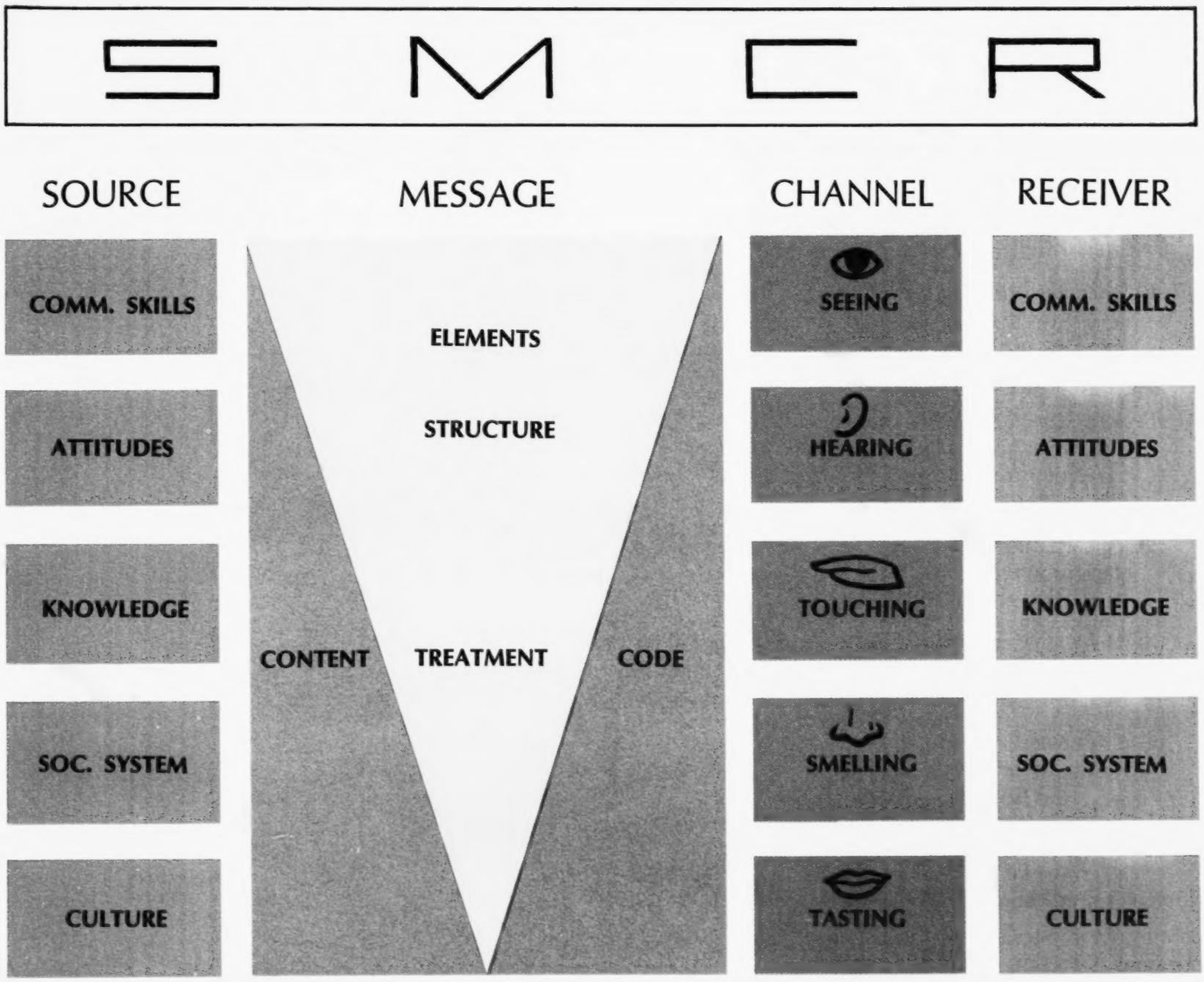
Far West Laboratory for Educational Research and Development. **Minicourse One: Effective Questioning in a Classroom Discussion.** Berkeley: 1968. (Currently being prepared for publication by the Macmillan Co., New York).

Floyd, W. D. **An Analysis of the Oral Questioning Activity in Selected Colorado Primary Classrooms.** Unpublished Doctoral Thesis, Library, Colorado State College. Greeley: 1960.

Gagne, R. M. **The Conditions of Learning.** New York: Holt, Rinehart & Winston, 1965.

Grossier, P. **How to Use the Fine Art of Questioning.** New York: Teachers Practical Press, 1964.

Berlo's Model of the Communication Process

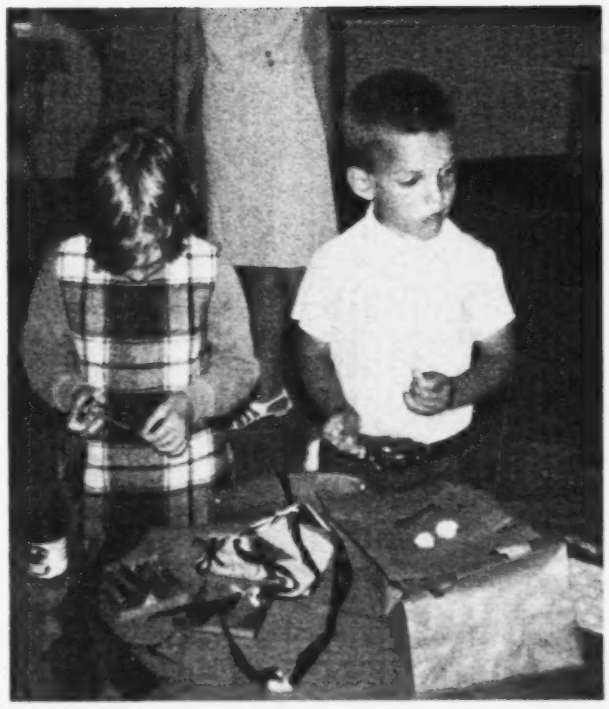


COMMUNICATION . . .
is the process

Each of the five preceding chapters has briefly described an educational theory or practice based on current research findings. They have been presented here because they typify the concepts and ideas with which teachers deal in their IMPACT inservice training sessions.

The problem constantly facing the IMPACT staff in planning these sessions is how to help teachers understand such concepts and ideas, and to understand them in enough depth to be able to work with them, manipulate them, test and evaluate them.

This problem is closely analogous to the problem faced by every classroom teacher—how to transfer the meaning of a given set of ideas from one person to another, from the teacher to the student. This is the fundamental problem in education. It is a communication problem. There may be no way to completely solve it, and there obviously is no single solution, but knowledge that it exists should certainly lead us to consider the nature of this process of communication we call "education."



Some Philosophy

According to David Berlo of Michigan State University, who has done considerable research on the process of communication,

> The average American spends about 70 per cent of his active hours communicating verbally—listening, speaking, reading, and writing, in that order. In other words, each of us spends about 10 or 11 hours a day, every day, performing verbal communication behaviors.

Berlo's estimate of 70% is probably low if applied to educators, since practically our whole working day is devoted to communicating. And, Berlo does not include in his estimate non-verbal communication—gestures, mannerisms, clothing, nervous twitches, tones of voice, facial expressions—which also disseminate considerable information especially concerning how we **feel** about what we're doing.

With the fact that we do communicate quite a bit firmly established, however, one question remains: Why? Aristotle said we communicate in order to muster "all available means of persuasion." This implies that the goal of communication in every case is persuasion, an attempt to change other men's minds to the speaker's way of thinking. Many teachers would balk at accepting this Aristotelian approach as it stands because it seems to place them in the role of propagandists.

Nevertheless, it seems we should at least go part way with Aristotle and grant that every effort at communicating is an attempt to somehow **influence** another person. We send out a message with the intent of eliciting some response from those who receive

"Saying things that are true has nothing to do with communicating. Having true things heard has everything to do with it. Too many teachers are in the business to say true things. If the student doesn't get the message, it is his fault. TV commercials don't work this way. If the audience doesn't get the message, they bounce the teacher."

—John Culkin

the message. The response may be overt—the nod of the head or the "uh-huh" that indicates comprehension—or, it may be covert, such as an increase in knowledge.

All this really says is that a teacher is supposed to be trying to get ideas across to students. It's an old idea and it sounds simple. Yet, because communicating can become a habit with teachers just as it can with other professional communicators, we sometimes forget who our audience is. Berlo describes the phenomenon in his book, **The Process of Communication:**

> Many writers are not trying to affect their readers—they are trying to keep their jobs and to elicit the response from their supervisors and colleagues, "He gets a lot of things done." Many producers, teachers, extension workers, supervisors are not trying to affect their apparent audiences. They are trying to win the approval of their peers, to get colleagues to say, "He's one of us, he conforms to the way we do things around here."

Process?

We are talking here about a process. Process may be defined as an interaction among various elements in a given situation in which each element somehow affects all the other elements over a period of time. Up to this point, we've considered only two elements in the education process, the teacher and the student. And, if it is true, as Berlo claims, that the habitual repetition of the act of communicating can lull us into forgetting who our real audience is, it must be even more true that we can easily ignore other elements in the education-communication process.

How many elements are there in this process? Aristotle said there were three: 1) the person who speaks, 2) the speech he produces, and 3) the person who listens.

Other models of communication behavior more accurately reflect the complexity of the communication process. Back in 1947, for example, the Bell Telephone Laboratory commissioned Claude Shannon and Warren Weaver to develop a communication model. What they came up with is called the "mathematical theory of communication," and it shows five basic elements of communication: 1) a source, 2) a transmitter, 3) a signal, 4) a receiver and 5) a destination.

This Shannon-Weaver model was developed to help engineers create more efficient electrical and electronic communication systems, so it isn't directly applicable to the kind of person-to-person communication we normally think of as taking place in the classroom. It did, however, provide a good base for communication researchers in the social sciences to build models more appropriate to interpersonal communication.

The SMCR Model

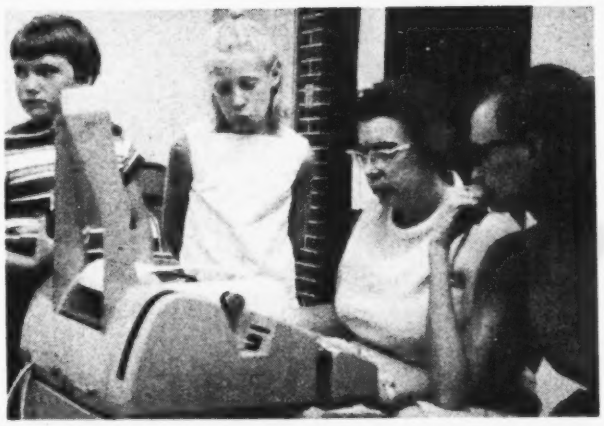
Among the most useful of these newer models is Berlo's SMCR model. The "SMCR" stands for source-message-channel-receiver, which are the four basic elements in the model. In an educational

context, the teacher is normally the source. The **source** encodes **messages** for a purpose (hopefully, that learning will take place). He transmits his messages through the air using his voice—this is his **channel** of communication. The ears of the student, who is the **receiver,** are stimulated by the sound waves and his central nervous system interprets them into some meaning.

Each of the major elements in the SMCR model has important sub-elements. At first, such a detailed breakdown of the communication process may seem to be complicating the picture unnecessarily. Even the simplest of communication situations, however, can be surprisingly complex, as Berlo illustrates. He describes a situation in which Bill and John are eating lunch and Bill wants to ask John for some salt for his sandwich:

> Suppose Bill did not have a clear idea of his purpose. He knew he needed something for his sandwich, but he did not know what he needed. How could he have instructed his encoder to transmit a message?
>
> Suppose Bill did not like John, or thought that John was inferior to him. This information might get through to his encoder, and the message might come out something like, "Hey, you, gimme the salt—now." John might pass the salt —or he might say, "Get it yourself."
>
> Suppose Bill was a new clerk in the company and John was a Vice-President. Bill might not feel that he should start any communication with John—and Bill eats a sandwich without salt.
>
> Suppose wires get crossed between Bill's nervous system and his encoder, and he produces an embarrassing message such as "Sass me the palt." Suppose his encoder is deficient, and it substitutes an "m" for an "s;" the message becomes, "Pass me the malt." Either John gives Bill something Bill doesn't want or he doesn't give him anything at all.
>
> Suppose the coffee shop is crowded and noisy. John does not hear Bill because the communication channel is overloaded. Result—John does not respond, and Bill never eats with John again.
>
> Finally, suppose John and Bill come from different cultures. In John's culture people do not eat salt on meat. Result—he might not understand Bill, or he might not think as well of him.

Implicit in this example are many of the factors which are delineated in the SMCR model. Some of the most important of these relate to the **people** in the process, the teacher and student, or any source and any receiver. Since both the source and receiver are people, we need to examine those things about people that either help or hinder their attempts to communicate with one another.



Communication Skills

Basically, five verbal communication skills are used in the classroom. To encode messages, teachers and students must be able to speak and to write. To decode messages, they must be able to read and to listen. Finally they must both be able to process messages—to think or to reason.

Writing requires that we have an adequate vocabulary, that we know how to spell the words in that vocabulary properly so someone can decode our messages correctly, and that we know how to arrange the words in that vocabulary in certain sequences understandable to the reader. The reader requires a corresponding set of abilities. In short, the writer and the reader need to have a facility in using the "code" we call language.

Speaking requires a somewhat different set of abilities. The speaker needs to know how to pronounce words, to give his voice the proper inflection, and how to use effective non-verbal gestures. Once again, it is a matter of sender and receiver knowing and agreeing upon the same code.

Most educators understand these underlying principles of communication fairly well, whether or not we behave in the classroom as though we did. We also can see that it would be reasonably simple to generalize from the reading-writing and speaking-listening examples to the other communication skills, such as painting, sculpture, music, photography and dancing.

It is the fifth communication skill that is most difficult to understand—i.e., how people think. You have read elsewhere in this booklet that philosophers and psychologists have recently taken a much more comprehensive look at this process of thinking. Based on the work of one of these men, J. P. Guilford of the University of Southern California, it appears that human beings can process information in possibly 120 different ways. Volumes have been written on this subject and it is still under active exploration by many researchers.

To the teacher as communicator, however, the important thing to remember is that he should not place too severe a limitation on the type of thinking-response he will accept from students; that since there are so many potential ways of processing information in any subject-matter area, there can logically be no strictly "right" way of thinking about anything. The teacher, as source of communication should be ready for a variety of responses and be willing to adjust his message-transmissions to the types of feedback he receives from his students. This is only one reason for "individualized" instruction, but it is a substantial one.

Attitudes

A second factor which is common to both of the human elements in the SMCR model is attitude. The concept of attitude is another difficult one to grasp, and, like thinking, it is under active study by psychologists. Basically, however, attitude can be thought

of as a predisposition or a tendency to be favorable or unfavorable toward someone or something.

For both the teacher and the student, attitude can affect communication in at least three ways:

Self Concept. First, each has some attitude toward himself. Each person has a certain level of self-confidence in any given situation. Most teachers suffer some "stage-fright" the first day of class. Some have it all year. Some students who are filled with self-confidence Friday night on the football field may be unsure of themselves in the classroom setting.

"All too often we are giving our young people cut flowers when we should be teaching them to grow plants. We are stuffing their heads with the products of earlier innovation rather than teaching them to innovate. We think of the mind as a storehouse to be filled when we should be thinking of it as an instrument to be used."

—John W. Gardner

Both research studies and common experience tell us that people tend to communicate more effectively if they have a reasonably high level of self-confidence. The doubter, the shy person, the procrastinator, the "nervous nellie" are generally ineffective communicators because, in one way or another, they are **afraid.** They are afraid their performance will be unsatisfactory in their own eyes and in the eyes of those with whom they are attempting to communicate. It appears that this is one good reason both students and teachers would benefit greatly from classrooms in which they can relax a bit and in which there is considerable mutual respect for one another and for one another's ideas.

Subject-matter. Second, both teacher and student have an attitude toward the subject matter at hand. Most business firms are well aware that it is foolish to hire a salesman who does not believe in the value of their product. It's just as inane to assign a teacher to a subject-matter area he does not believe is valuable or a student to a class he can't get interested in.

The "practicalities" of education being what they are, it is difficult to imagine a school in which each teacher and each student are consistently enthralled with all the subject-matter with which they must deal in the curriculum. Nevertheless, as professional communicators, teachers must realize that the attitude they themselves hold toward a subject-matter and that held by their students will seriously affect the efficiency of communication about that subject matter.

In this regard, the research literature on attitude formation and attitude change can be of assistance to the teacher. It would appear, based on that research, that teachers interested in improving attitudes toward their subject matter might do well to set a situation in which the class, or groups of students within the class, perceive themselves as peers (respected equals) with some group identification and in which the teacher himself serves the students as an "opinion leader."

To do this, the teacher would necessarily be removed from his pedestal as omniscient master of the subject to a level of more nearly equal status with the students—one desirous of learning more. The teacher would still obviously have the most knowledge of the subject-matter and have more sources of information on it than would most of the students. The research in this field of attitude formation

Nicholas Murray Butler used to insist that in the Garden of Eden, Adam paused at one point to say, 'Eve, we are living in a period of transition.' But no sensible person would assert that earlier centuries experienced change as the twentieth century has experienced it. A radical speeding-up of the tempo of change is at the heart of the twentieth-century experience and has gained a powerful grip on the modern mind."

—John W. Gardner

and change conducted thus far seems to indicate that such an opinion-leadership role for the teacher is not incompatible with the teacher's simultaneous role as an "imposed leader"—the group member in charge of enforcing rules.

Teacher-student attitudes. Finally, teachers and students, as sources and receivers in the communication process, have attitudes toward one another. It is difficult to communicate with someone you dislike. It is difficult, too, to construct and send messages to persons against whom you are prejudiced or whose behavior has in the past disturbed you. It is equally difficult to receive messages from a person who obviously thinks you are inferior to him socially or academically.

The evidence of research in regard to this factor has one logical implication: We could communicate better if we all **liked** one another. In spite of this country's Judaic-Christian tradition, we have yet to realize this ideal of universal brotherly love. As a communicator, however, it is the teacher's job to maximize good feeling and friendliness in the classroom.

Knowledge

The third factor in the SMCR model which is common to the source and the receiver is knowledge. Clearly, both of the people in the communication process need a certain amount of knowledge about the subject being discussed. If they didn't, they simply couldn't talk about it at all. The question is, how much knowledge is desirable? Too much knowledge, on a specific topic or sub-topic can cause one to become too specialized to the point that his "jargon" is not understandable to others. Too little knowledge can cause one of overgeneralize to the point that what he says is essentially meaningless. On this point, Berlo uses the classroom situation as a specific example:

> This dilemma is represented by the oft-heard argument over how much a teacher needs to know in order to teach. Some argue that he does not need to know anything, he merely needs to know how to teach. Others argue that he does not have to know anything about teaching; if he knows his subject matter thoroughly, he will be able to transmit this knowledge effectively. Clearly, both positions are fallacious when stated this way. The source needs to know his subject matter. He also needs to know how to teach it effectively.

Society & Culture

Finally, in considering the attributes of the source and the receiver in the SMCR model, it is necessary to examine the social and cultural backgrounds of each. As Berlo says,

> People in differing social classes communicate differently. People from different cultural backgrounds communicate differently. Social and cultural systems partly determine the word choices which people make, the purposes they

have for communicating, the meanings they attach to certain words, their choice of receivers, the channels they use for this kind of message, etc.

In education, we have come to realize of late that social-cultural differences we had long ignored are important after all. The white middle-class types of IQ tests we had long espoused are not effective in indicating the intelligence levels of black ghetto students because "they" don't communicate like "we" do.

Perhaps more subtle, but perhaps also just as important, are differences in communication which are dependent upon the way our society views the role we play in it. As Berlo points out, an Army captain doesn't talk the same way to a group of sergeants as he does to a group of colonels. What we think of the roles of ourselves, our fellow teachers, our administrators and our students is important to the way we communicate with members of each group. If we hold students in high regard as a social group, for example, the probability is that we will have more effective communication with them than if we hold them in low esteem.

Non-Human Elements

Thus far we have considered those factors in the communication process directly related to the persons involved in that process. The SMCR model also contains two non-person elements, the "message" and the "channel." They are, in fact, much less complex and less important than the human elements. One would not draw this conclusion, however, from a study of most of the literature available in the various fields of communication.

In English, journalism, speech, creative writing and similar academic disciplines, the concern has largely been with the construction of messages that are "proper" or aesthetically eloquent. In business, students of advertising and marketing have placed great stress on the "medium." Rating services such as the Hooper and Neilsen tell television and radio sponsors how many people are exposing themselves to a given medium (channel). Latest to get into the act is sometime college professor and communication consultant Marshall McLuhan, who in his **Gutenberg Galaxy, The Medium Is The Massage,** and other books, renews once again the argument over whether messages and channels manipulate people or whether the reverse is true. His theory is that the message and the channel are actually the same thing, and is a variation on the traditional thesis that it is the non-human elements that do the manipulating.

Models such as the SMCR model are based on the assumption that human beings use messages and channels to communicate with one another. This assumption is backed up by considerable research in the behavioral sciences. If it is true, it does not mean that these non-human elements in communication are not worthy of extensive study, but that they should not be studied as if they somehow operated independently of the human elements. With this in mind, let us consider the remaining parts of the SMCR model.

"Nobody starts off stupid. You have only to watch babies and infants, and think seriously about what all of them learn and do, to see that, except for the most grossly retarded, they show a style of life, and a desire and ability to learn that in an older person we might well call genius. Hardly an adult in a thousand, or ten thousand, could in any three years of his life learn as much, grow as much in his understanding of the world around him, as every infant learns and grows in his first three years. But what happens, as we get older, to this extraordinary capacity for learning and intellectual growth? . . .What happens is that it is destroyed, and more than by any other one thing, by the process that we misname education. . ."

—John Holt

Message

The **message** can be said to consist of a "code," a "content," and a "treatment." In fact, this is what Berlo **does** say. What he means by each of these is roughly as follows:

Code. Most of us played with "secret codes" when we were children. Remember how you break a secret code? You look for certain elements (sounds, letters, words, etc.) to appear and reappear in some pattern that can be interpreted as meaningful. This meaningful pattern is sometimes called a "syntax." Thus, the English language is code. So is music, painting, the dance, antimated cartoons, etc. Communication is greatly enhanced if all parties involved in the process are thoroughly familiar with the code in use.

Content. What you have to say is the content of your message. Generally, in verbal communication this consists of information, assertions, inferences, and judgments. It, too, is necessarily structured. Some of it must come first, some in the middle, some last. Communication is normally improved if the content is presented by the source to the receiver in some clearly-structured manner.

Treatment. If both the code and the content must be arranged in a pattern or a structure by the source, he must obviously make some judgments about **how** he will arrange the code and content elements. He must select a pattern. This might be more familiar to us under the label of "style." John Kennedy, Edward R. Murrow, William Shakespeare, and Ernest Hemingway had characteristic verbal communication styles. They consistently patterned or structured their communications in certain ways. These particular men evidently had very effective ways of treating messages. Quite possibly, this is because they kept constantly in mind the purpose for which they were communicating—to get someone to know, accept or do something.

Channel

The **channel** is the vehicle by which a message is to be delivered. We receive messages through our five senses, but some means of those messages reaching our senses is essential for communication to take place. In discussing the "channel" portion of his model, Berlo points to the educator as one example of a person who must make decisions concerning the channel:

> In education, we usually fail to analyze teaching from a communication channel point of view. For example, we do not often raise such questions as:
>
> 1. What kinds of messages should be transmitted orally in the classroom?
> 2. What kinds of messages should be transmitted visually, through books?
> 3. What kinds of messages should be transmitted visually, but nonverbally, through pictures, rather than words?

4. What kinds of messages should be transmitted physically, through touch, by having students actually perform certain tasks, examine and manipulate certain objects, etc.?

"A major task of the communication consultant is getting people to analyze their purposes for communicating and to specify them in terms of responses they want to obtain."

—David K. Berlo

How does a teacher answer such questions? One possible method is to seriously consider the capabilities and the needs of your students. If you have a "slow reader" group, does that mean they should not learn as well, or that you should "switch channels" and use videotape, movies, or stereo records? If your students are teenagers, is it better to raise questions in social studies by using a textbook, the writings of Eric Hoffer, or Simon and Garfunkel record albums? If your students are trying to learn the chemistry of aqueous solutions, is it easier for them to learn by hearing you lecture about it or by rolling up their sleeves and manipulating the materials?

A Warning

The SMCR model is one of many models of the communication process. It is a somewhat complex model because it strives for a realistic examination of the many elements and sub-elements in the process that can either enhance or impair success of communication. In studying this or any model, it is important to realize the elements delineated within the process are not independent of one another. They intertwine in such a way as to be constantly affecting one another. Therefore, while it is useful to examine the various elements in communication, it is at the same time dangerous to become engrossed in the functioning of any one element or set of elements to the exclusion of the others.

And a Word on "Selectivity"

Finally, there is one element not specifically mentioned in the SMCR model, but which follows logically from the examination of its interacting elements—the element of selectivity. We human beings simply do not pay attention to every message sent our way. It is the truly naive teacher who believes he has a captive audience in his classroom. Students, like everyone else, **select** those messages to which they will expose themselves.

They tend to **retain** information on a selective basis. Even so primitive an instrument as the Friday morning "pop-quiz" will reveal certain gaps in student retention.

Together, these selective tendencies in human communication reception make the job of the educator-communicator a particularly difficult one. As a communication source, he, too, must be selective in an effort to establish as effective communications as possible. In the final analysis, this may be the most significant motivation the educator has for devoting considerable study to the process of communication. Certainly it is the reason the IMPACT staff places such emphasis upon it.

"We destroy the disinterested (I do not mean uninterested) love of learning in children, which is so strong when they are small, by encouraging and compelling them to work for petty and contemptible rewards—gold stars, or papers marked 100 and tacked to the wall, or A's on report cards, or honor rolls, or dean's lists, or Phi Beta Kappa keys—in short, for the ignoble satisfaction of feeling that they are better than someone else. We encourage them to feel that the end and aim of all they do in school is nothing more than to get a good mark on a test, or to impress someone with what they seem to know. We kill, not only their curiosity, but their feeling that it is a good and admirable thing to be curious, so that by the age of ten most of them will not ask questions, and will show a good deal of scorn for the few that do."

—John Holt

RESPONSE . . . how teachers apply IMPACT's theories

No communication is truly complete without some response to the message sent. Some "feedback" must reach the source in order that he know communication has actually taken place—that he has not been "talking to a blank wall." In the case of Project IMPACT, the IMPACT staff and the various resource personnel who assist them are the sources, and the feedback which lets them know they've communicated is the attempt by teachers to apply in the classroom the ideas and theories the staff present to them.

In the case of many of the short workshops and meetings conducted by IMPACT, it is often difficult to know for sure whether teachers actually are putting the educational theories to the test in their classrooms. In the case of the IMPACT Summer Institute, however, the staff was able to build-in a feedback mechanism.

Each morning of the institute was spent in actual classrooms, using volunteer students who came with a full realization that they would be helping teachers try out some new educational ideas. Each teacher belonged to a team of about ten members—all of the same general grade level—who worked together to plan the course of instruction their 50 students would receive. In addition, each team was asked to submit a diary or a "log," at the end of the institute recounting the ideas they tried in their classrooms (each team had two or three rooms available), and the response they got from the children when the ideas were tried.

The resultant feedback consisted of ten volumes of reports of ideas, methods, theories, hunches, games, and approaches that were tried. Some were successful, others failed. The only consistency was that it was always the teacher—not some outside "expert"—who was the judge of the success or failure of the attempt. With hundreds of reports of classroom activities submitted in the journals of the ten teams, it is impossible to present a significant portion of them here. Instead, included in this chapter are one or more reports from each of the teams. They should not be considered the "best" or "worst" of the reports; they have been chosen because they are typical and hopefully therefore the most representative of the efforts the IMPACT teachers undertook.

Team I (Grades 1 & 2)

Science—

This lesson was undertaken to give the class an opportunity to form hypotheses, to discover through experimentation, to do convergent and divergent thinking, and to control experimental conditions.

The idea was to use provocative questions to incite knowledge-exploration and discovery; to let them explore the mystery of things through deductive thinking and to see the dynamics of things.

Our room had been decorated with balloons. The fact that some did not remain inflated seemed to suggest the problem, "What baffles us about air?" This led to questions such as, "Does air take up space?" and "Is air **everywhere**?" We **listened** for sounds (a slat on the blind was moving); we **looked** for signs of air (some streamers were blowing); we **felt** the air go in and out of our nostrils—but we found we could not **taste** it.

The class divided into three groups with one teacher in each group. One group experimented and found that air in a glass tumbler kept a paper placed in the bottom of the glass dry when it was placed (inverted) in a bowl of water.

Another group placed a balloon inside a jar, then inflated it. This made it possible to lift up the jar by lifting the tied-end of the balloon.

The remaining group found that a deflated balloon fit nicely inside a small box, but when it was inflated, it would not go in. They decided, however, that in both cases, the balloon did take up **some** space.

There was so much interest on the children's part that we could easily have continued the study the following day. In the interests of time, however, we limited the second day's session to a period of brainstorming. In this the children thought fluently, naming and recording all the places where air can be found. In doing so, they established such concepts as the existence of a vacuum inside a tornado.

* * * * * * *

Language Arts—

I had the children arrange themselves in two concentric circles, with six children and the teacher in the inner circle. The children in the outer circle were asked to observe while those in the inner circle tried this new activity, which we would use again in small groups next Monday.

I showed the children a masked picture and had them theorize for a few minutes as to what they thought was under the masked portion. Then they chose the best answer and explained why they chose it. Next, each of the six pantomimed his choice. Finally, I revealed the masked portion.

Following this demonstration, I reviewed the procedural steps in the activity so that all the children would understand how to do it on Monday in their small groups.

The children were very excited about trying to discover what was under the masked section of the picture. The observers in the outer circle had a difficult time remembering not to participate in the guessing. All of the children were eager to try this on Monday.

Had I to do it again, however, I would not review the steps of procedure with them until they were actually getting ready to do the activity again. They were too restless by the time I completed this. Also, I feel that they probably could have done the activity in their small groups without seeing the demonstration.

Team II (Grades 1 & 2)

Mathematics—

I wanted the children to learn to elaborate and to be intellectual risk-takers in math, by using Dr. Frank Williams' strategies of thinking-of-possibles, attribute-listing, and organized random search.

The approach I took was to tell them that I had a "rule" in mind, and they were to find out what it was. To do so, they should give me any number, and I would answer with another number, following my rule. If a child said "nine," for example, I would answer "eight."

To show that he had figured out the rule, a child would have to give a complete example—e.g., "If I say seven, you're going to

say six." The slower children needed a few more examples than the quick ones, but all soon had the idea.

The next step was to let the children think up their own rule and let the class see whether they could figure it out. The children could either state the rule or write out a complete example of it on the board.

Comment: There was a large amount of participation by all the children in this activity because it was easy to understand the method I was using and because they weren't apprehensive about what my reactions would be to a "wrong" answer.

Team III (Grades 1, 2 & 3)

Language Arts—

We showed the film **Hailstones and Halibut Bones** to help the children recognize the emotional impact of colors by thinking fluently and flexibly.

Before the film, the children were asked to think of their favorite color and to watch for it in the film. They were also asked to find a relationship between hailstones and halibut bones.

After they watched the film, the children were asked once again to name their favorite color, and asked how it made them feel as they watched the film. The words they used to describe their feelings were written on the board with chalk of their favorite color. After each had had an opportunity to do this, they were asked as a group to mention any other color they wished and how it made them feel.

Evaluation: There were many and varied responses to each color. Most of the children were quite fluent, but were not flexible in their thinking about different colors or feelings.

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Social Studies, Language Arts—

We had a unit on the circus. In an effort to help the children learn how we so often associate the type of costume a person wears with his role in life, I passed out a variety of hats, one per child.

I explained that we were going to use the "yes-no" method, which is also called "inquiry." The children could ask me any question they wanted in order to find out who might wear a certain costume (a hat and cane, e.g.), but I would answer only yes or no.

It took considerable time for the children to adjust to this method. One little girl might start out by saying, "An elephant might wear that hat," and have to be reminded to restate it in question form so I could answer yes or no.

Gradually, however, they developed a facility for the method and began each query with "Would an . . ." or "Is it . . ."

Team IV (Grades 3 & 4)

Language Arts, Science—

Like a child running away from home who never gets beyond the sidewalk in front of the house, I started teaching in IMPACT Summer Institute much as I had in my home school. The usual lessons on parts of the newspaper and ways that important news stories are placed and highlighted were old stuff in a new place.

When I discovered that my teaching team, the children, and the IMPACT staff were willing to let me experiment with some

"It will soon be impossible to entice any reasonably awake person to accept any high political or business position, for the echelons of the old organization chart are beginning to look as meaningless and starved as the calculations of a medieval astrologer."

—Marshall McLuhan

new ways to humanize **my own** teaching, I ventured a little farther. Still clinging to an old idea that had worked well before, I started a lesson in team-reading of library books and then "allowed" the children to choose their way to advertise the book their team read. They chose partners and one book for each team. They sat together in various parts of the room and read aloud to each other until they had finished the book. Such "quiet" noise and such busy, happy children. Then each team advertised their book—talks from the podium, colored advertisements, riddles and slogans, etc. The interest was great and the results were far superior to those that were the results of orders to "make an oral book report."

Then I decided that, since I was running away after all, I may as well venture a little farther. Why not try some strategies from Frank Williams' Idea Book—provocative questioning, for example, or the reinforcing of originality.

So, the children examined an antique ice cream dipper, and tried to imagine what it had been used for back in 1879. Then they shifted gears and imagined that it had been brought by a creature in a space ship and wondered how it had been used by the alien creatures. Every idea was accepted and so many ingenious uses were forthcoming, including, of course, the "correct," use.

Moving still farther from home, I tried an inquiry lesson. I planned a question-answer period about a hive of bees, a smoker, a hunk of wax and a bee mask that were in the room when the children arrived in the morning. But the lesson just happened, without much help from me. As the children gathered around the bees and were discussing them, I started copying their questions on the board as fast as I could. When the children noticed what I was doing, they started dictating the questions to me. Twenty-nine excellent questions about bees and beekeeping were generated. Then we showed two movies on beekeeping, and the children watched them with great interest because of the questions they had generated.

Success at getting so far from home helped me move on. Before the children viewed the movie, **Nature's Half-Acre,** we held an inquiry period, with the children proposing things they expected to see in a movie with that name. I would respond to each suggestion with a "yes," "no," or "maybe." Interest ran high and they must have had more experience with this technique than I did, because they had little difficulty phrasing their questions. It didn't even hurt that some of the children had seen the movie before — their suggestions only further heightened the interest of the others.

They watched the movie attentively and then discussed the accuracy of their pre-showing suggestions. Then I asked them to classify the things they saw in the movie. Two examples of their classifications: things that prey on others, and things that are camouflaged.

Several times I was ready to run for home when ideas flopped or the children simply refused to take the bait. A lesson "feelings" that I had great hopes for brought only **one** serious response. Overall, however, I enjoy being away from "home," and I'm looking forward to traveling even farther during the coming academic year on this journey to humanize my teaching and help children learn to think.

"It is in fact nothing short of a miracle that the modern methods of instruction have not yet entirely strangled the holy curiosity of inquiry; for this delicate little plant, aside from stimulation, stands mainly in need of freedom; without this it goes to wrack and ruin without fail."

—Albert Einstein

Team V (Grades 3 & 4)

Scheduling of Instruction—

After our first week of teaching in the IMPACT Summer Institute, our general feeling was one of confusion and discontentment with the low level of success we felt we'd had.

Our main problem seemed to be one of mechanics—where should the children go and when; when should recess and bathroom breaks come? Should we have a rather rigid structure or be loosely structured?

We decided to try a method under which the children would plan their own schedules within certain limits. Time-sections were established as follows:

8:30 - 8.45 Teacher Planning
8:45 - 9:15 Instruction
9:15 - 9:45 Instruction
9:45 - 10:20 Recess
10:20 - 10:55 Instruction
10:55 - 11:30 Instruction

Then we listed on the board the activities which would be offered during each instruction time-block. Thus, the children had four periods, and could make decisions as to how they would spend each.

They greatly enjoyed this sort of activity, and it seemed quite successful at first. Soon, however, the children began to choose activities that required little thought or effort. Also, they maneuvered to be in the group with their best friends rather than choosing a topic that might really interest them. Thus the student-choice idea slowly fell by the wayside as we teachers more and more felt the need to use a more structured approach.

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Language Arts—

To get the children to express themselves orally, I displayed an ordinary lead pencil. The children were asked to give words and phrases that described the pencil or its properties.

Next, the children imagined that they were pencils themselves, and were asked to write a short story about their experiences as pencils.

The children were apprehensive about the approach at first. But as we talked and changed our hair to erasers, faces to metal, and bodies to wood and our feet became pointed, the children began to smile and eagerly wrote their interpretations.

Team VI (Grades 5 & 6)

Science—

On Wednesday, we divided the children into four groups to let them experiment, observe or inquire into various encounters we provided. The main purpose of this was to increase their skills of observation. The students were encouraged to write down their observations and to discuss with their group what was happening. In addition, two or three questions were written on a paper at each encounter table to help the children find a launching point for their observations. These were general questions concerning what was happening and why.

The four encounters were:

(a) A tray of 25 objects was placed on a desk and covered with paper. The students were given time to view the

objects. They were then covered again and the students were asked to write their observations of what was there.

(b) A problem was posed: A stack of ten books of the same size were placed on the table. The students were asked to stack the books so that each overhung the other and they all overhung the table. When that task was completed, the teacher suggested others. Can you do it so that the last book completely overhangs the table? What would happen if you turned the books another direction and tried it?

(c) The group was asked to observe the inquiry film-loop entitled **Walking.** They were asked to observe the ways animals walk and to formulate theories as to why. Discussion among the group members was encouraged.

(d) The students were given eye-droppers, waxed-paper, newsprint (paper), and water. They were asked to observe the way water acted when placed on the different kinds of paper. They were allowed to experiment in any way they wished with the items provided and to develop theories about how water acts based on their observations.

The teachers felt the day was a success. The students had taken an interest in their activities. They rotated freely among the four encounter areas and used this freedom intelligently. Also, they appeared to work well in groups and formulated interesting theories to accompany their observations.

Team VII (Grades 5 & 6)

Social Studies—

On June 23 I presented a discovery-oriented project with two small groups as a follow-up to an earlier presentation on water pollution. City "A" represented Des Moines, and City "B" represented Ottumwa—but the students were not told this. Questions were posed: "What is City A doing to cause pollution in City B?" "How do the people of Cities A and B feel about one another?" "Should the people of City A be concerned about the pollution?" "Can you identify the two cities?" "What can the people of the two cities do to solve the problem?"

The first of the two groups was difficult to "turn on;" the second group obviously brought more knowledge of the pollution problem to the discussion. They had no difficulty identifying the cities (thus indicating they had been keeping up on current affairs in Iowa). As for solutions to the problem, both groups had some wise, logical ideas and also some "kill 'em off" solutions. The experience tells me that we need to help children learn to work in groups and also to develop a higher sense of values.

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Drama, Social Studies—

Since we are using the theme of hunger in the world, several of us created a two-part play depicting two homes. One was in Des Moines and the other in India. The time in both cases was 1969 and the scene was a typical evening meal.

In preparation, the class read and held discussions about Indians and their way of life—particularly about their mealtime

customs and the types of food they would be likely to eat at dinnertime.

In spite of this preparation, we weren't too happy with the Indian scene. The children seemed to lack feeling for the characters they portrayed. They talked in terms of doing some further research into Indian life, but few did.

This lack of feeling lasted, even though we enacted the play for the other 45 children in our group and later video-taped it. Perhaps we needed to present more material for further understanding of a way of life so foreign to the children.

Team VIII (Grades 7, 8 & 9)

Music, Social Studies—

Several recordings of musical compositions were played for the students. The recordings were paired and the children were asked to determine which of the two in each pair was most recently composed. They then launched into a discussion of how we know how old a piece of music is and why the different generations of people have tended to have their own characteristic tastes in music. How we go about classifying music as "traditional," "modern," "classical," "jazz," etc. was discussed, too, as was the use of the various instruments in the different types.

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Language Arts—

The first step in this lesson was to have students work in pairs to develop seven collages, using poster paper and a variety of magazine pictures and printed matter. Then each of the collages was used by the students as a vehicle for the composition of a short story. Each story was begun by simply writing down one-word reactions to the poster being considered. The story was completed by adding verbs and articles to the reaction-words. Finally, the class developed a number of ways that stories can be told without using words.

The students seemed to feel these exercises were productive and suggested that the same technique might be used with other objects besides collages as the starting points.

Team IX (Grades 8 & 9)

Science, Computer Language—

The class was divided into four groups. Each group selected one of Earth's neighboring planets to visit via a space ship simulated by the computer. The task was to find the time required to travel to their respective planets. The distance to each planet was given. The students gave the computer an input of their desired rate of travel in feet per second or miles per hour. Based on instructions given it prior to the start of the problem, the computer printed out the time required. In the process, the students learned the BASIC computer language and gained some insight into the relationship between time, distance and speed.

The next phase in this same problem was to inform each spaceship crew that they were not going to have a safe landing on the planet they were going to because some of their landing rockets were malfunctioning. Using a list of those things on board the spaceship, they were to develop a list of the ten most important items to be placed in shock-proof compartments in the ship to help them survive on the planet. This required that they find out all the information they could about their respective planets, in-

"We cannot talk about anything without imposing some structure on it, without naming it, putting it in some form. Man can perceive the world as what William James referred to as a 'blooming, buzzing confusion.' But man cannot operate in the world, cannot talk about the world until he structures it in some way."

—David K. Berlo

cluding the amount of oxygen in the atmosphere, surface temperature, presence or absence of water, etc. Books, films and research studies were made available for this purpose. Required calculations were worked with the aid of the computer (e.g., how long will a 300-lb. flask of oxygen last under a certain set of atmospheric conditions?)

Later, the students shared with one another the adventures of their search for answers to the problems they faced on their planets.

"If a man doesn't keep pace with his companions, perhaps it is because he hears a different drummer. L[illegible] him step to the music which he hears, however measured or far away."

—Henry David Thoreau

Team X (Grades 9, 10, & 11)

The work of students and teachers in Team X began with several group discussions which were held in an effort to determine what problems are really most serious in American society. The overall conclusion of these discussions was that conflict was at the root of most problems and that conflict was often caused or added to by a lack of communications.

The students decided to break up into smaller groups to take on various phases of conflict, and faculty members were assigned to each sub-group to act as resource personnel.

The groups concentrated on the areas of: (a) crime vs. law-and-order; (b) escape vs. reality; (c) poverty vs. wealth; (d) war vs. peace; and (e) communication.

Crime vs. Law-and-Order:

This sub-group used several approaches to the problem, including group discussions to clarify understandings of the law-and-order crisis, a visit to a trial at the county court house, viewing a film about the Salem witch trials, an investigation of the development of the concept of law through the ages, and projects and reports on such approaches to law as the Code of Hammurabi, the laws of Manu and the U. S. Constitution.

Escape vs. Reality:

Group discussions also helped this group decide what questions were most important to investigate. The decision:

1. Are drugs, alcohol, divorce, suicide, and mental illness attempts at escaping everyday problems of our society?
2. What age groups specifically use these methods (i.e., drugs, alcohol, etc.)?
3. What are the major types of escape teenagers use?
4. What can we do to learn to cope with life's problems as we move from adolescence into adulthood?

To find answers to these questions, the group took trips to visit different community agencies and professional people who work in these problem areas. The police vice bureau, Alcoholics Anonymous, the psychiatric unit of the county hospital and a family service center were a few of the visits made.

Conclusion: The students did not learn answers to all the problems, but they did develop a more questioning attitude about the problems, and they became familiar with some of the agencies and community services that could help them if they should ever have a need.

Poverty vs. Wealth:

"If you were taken on a typical tour of Des Moines, it's probable you would be shown several shopping centers, a large downtown business and shopping area, many beautiful homes and churches and a stunning art center."

To show that this typical visitor's view of the city is not necessarily accurate, the students working in this problem-area arranged for a series of field trips into a variety of areas. With cameras in hand, they set about the business of seeing and documenting what kind of a city they really live in.

Their visits produced a number of contrasts. There was the "Southeast Bottoms," where many residents have neither running water nor sewer service. There was "Southern Hills," where $150,000 homes look down upon the city lying in the Des Moines-Raccoon River basin; a black mobile center in Des Moines' inner city; a visit to a county supervisor who was concerned about white poverty as well as black and who spoke of the aged and "ADC" mothers as being in dire need of help; the Oakridge housing project where low-income families are moving into modern townhouses; and a Lutheran social center where day care and education are offered to the children of working mothers.

The result of all this was a color-slide presentation, complete with sound-track which gave a penetrating view of the city and its problems and some of the people who are trying to solve them.

War vs. Peace:

Communications:

The purpose of our project was to show that we can communicate through pictures, sounds, and colors as well as through words. We tested groups of children, young adults, and teachers participating in IMPACT's Summer Institute. Among the students, we tested across the range from kindergarten through 11th grade.

In our tests, we asked people to list the emotion each picture, color, or piece of music prompted them to feel. Our major observation was that, as we went up in age level, answers became more diversified and specific. One of our major conclusions, therefore, was that, as maturity is acquired, expression is developed.

One interesting phenomemon, however, is that adults frequently answered in terms of opposing emotions; i.e., a person would reply "happy and sad" for the same picture or piece of music. This could mean that people don't completely know their own emotions, or that their exact inner feelings can't specifically be expressed. If the latter is true, we conclude that our current use of verbal communication through language is not doing a fully effective job in the realm of self-expression. Perhaps a completely new system of communication which is more effective should be developed.

WE CHOSE "WAR AND PEACE" AS A TOPIC BECAUSE IT IS ONE OF THE MAJOR CONFLICTS TODAY. WE DECIDED TO USE THE COMPUTER TO SIMULATE ACTUAL WAR SITUATIONS. ALTHOUGH THE COMPUTER IS NOT ABLE TO TAKE INTO ACCOUNT HUMAN JUDGEMENT AND STRATEGY, IT DOES GIVE A REMARKABLY ACCURATE PREDICTION OF VICTORY ON THE BASIS OF POWER.

OUR MAIN EFFORT HAS BEEN CONCENTRATED ON THE TWO PROGRAMS SIMWAR2 AND WARSHIP. WE WILL ONLY DISCUSS SIMWAR2 IN THIS REPORT.

SIMWAR2 (SIMULATED WAR NO. 2) IS AN EFFORT TO COMPARE POWER OT TWO ARMIES (RED AND BLUE). IF THE NUMBER OF MEN, ARTILLARY, AND PLANES ARE PUT IN FOR BOTH ARMIES THE COMPUTER WILL GIVE BACK AN ACCURATE PROBABILITY OF VICTORY FOR BOTH SIDES. WE WILL GIVE YOU A COPY OF OUR PROGRAM AND AN EXAMPLE OF HOW IT WORKS.

THE RELATIONSHIP BETWEEN THE MEN, ARTILLARY, AND PLANES ISN'T EXACT BECAUSE WE COULD NOT ATTAIN THE NECCESSARY STATISTICS, BUT THEY ARE AS CLOSE AS WE COULD DETERMINE.

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ZUP12:03 P 07/08/69  TUESDAY    CHI LINE 34
FOR ASSISTANCE CALL 245-6482, OUT-OF-STATE 800-621-2402
USER NUMBER,PASSWORD--DAD236,X
READY

TAPE
READY


SIMWAR2      11:30   06/30/69  MONDAY      CH

01 PRINT "INPUT A, B, AND C ARE EQUAL TO THE MEN, ARTILLARY,"
02 PRINT "AND PLANES OF THE BLUE ARMY.  INPUT D, E, AND F"
03 PRINT "ARE EQUAL TO THE MEN, ARTILLARY, AND PLANES OF THE"
04 PRINT "RED ARMY"
05 PRINT "IF THERE ARE ANY QUESTIONS, ASK JOHN BRENEMAN."
10 INPUT A, B, C, D, E, F
20 R=A+(B*25)+(C*75)
30 B=D+(E*25)+(F*75)
40 IF B>=A GO TO 100
50 N=B*100/(R+B)
60 P=100-N
70 PRINT N "PERCENT CHANCE OF BLUE VICTORY"
80 PRINT P "PERCENT CHNCE OF RED VICTORY"
90 GO TO 10
100 F=R*100/(B+R)
102 L=100-F
104 PRINT F "PERCENT CHANCE OF BLUE VICTORY"
106 PRINT L "PERCENT CHANCE OF RED VICTORY"
110 GO TO 10
120 END
?
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THE MEASUREMENT . . . research findings by Dr. Norma Trowbridge

Evaluation of IMPACT

Project IMPACT is a locally-initiated, federally-funded* attempt to encourage creativity in elementary and secondary classrooms. IMPACT has its own staff, working under the direction of the Polk County Board of Education. Polk County is located in central Iowa, and includes the metropolitan area of Des Moines — Iowa's capital and largest city. The project at first included the nine school districts within the county, but it has been extended to nearly 60 school districts in nine counties. IMPACT was officially launched in August, 1967 and is now in its third operational year.

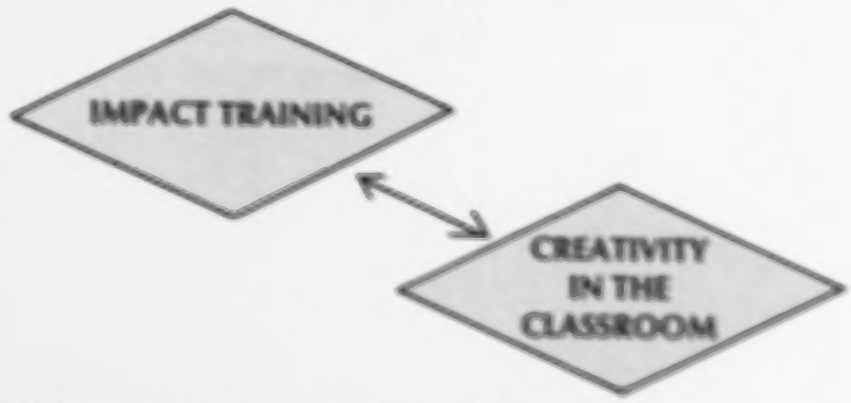
First Year

The early efforts of IMPACT were aimed directly at the concept of creativity in the classroom. An inservice teacher training program was developed, consisting of a series of two-day workshops during the school year, followed by a six-week summer institute. IMPACT's program attempted to encourage participating teachers to be creative in their approach to teaching, and to recognize and encourage creativity in students.

In this first year program teachers participating became acquainted with literature about creativity research, gained an understanding of the concept of creativity, and were exposed to individuals reputed to be knowledgeable in various aspects of creativity. They also were given opportunities to discuss their concerns about creativity among themselves and with IMPACT staff members.

From its inception, IMPACT made arrangements for the evaluation of its efforts. One staff member, Drake University associate professor Norma Trowbridge, who had had previous experience in creativity research, was assigned primary responsibility for the design and operation of the IMPACT evaluation program. The evaluation effort was undertaken with full knowledge that creativity in the classroom is an elusive concept and one which is extremely difficult to measure. Nevertheless, the knowledge that an experimental program like IMPACT would be of little worth to others if it could not be evaluated prompted the staff to persevere.

Investigation 1, the original and perhaps still most important evaluation conducted in IMPACT, was a direct attempt to associate IMPACT training with its ultimate objective, creativity in the classroom.



Investigation 1

*The studies reported here are part of the total research program of Project IMPACT, supported by U.S. Office of Education Grant No. OEG-3-7-703575-3053 under Public Law 89-10.

Assistance in the area of research design and statistical interpretation was provided by the American College Testing Program through a postdoctoral research fellowship for the Project's research director.

It became evident early in this investigation that the primary evaluation of IMPACT would necessarily be in terms of classroom activity. The problem of defining and measuring creativity thereby took a classroom setting. Much of the early research effort was directed at this "criterion" problem, i.e., the development of instruments and techniques which would define and measure classroom creativity.

Considerable experimentation with paper-and-pencil creativity tests developed by J. P. Guilford, S. A. Mednick, and E. P. Torrance showed this approach to be unsatisfactory for the kind of evaluation IMPACT was attempting. Eventually, a criterion was adopted which was based on Guilford's conceptual definition of creative thinking, coupled with a measurement instrument designed by Mary Jane Aschner and James Gallagher.

In his model of the "Structure of Intellect", Guilford describes five classifications of thinking processes. "Memory," "cognition," "convergent-thinking," "divergent-thinking," and "evaluative-thinking," according to Guilford, are the five broad categories under which all human thinking activity can be placed. Of these five, Guilford and other researchers say, divergent thinking, and to a lesser extent evaluative thinking, are most closely associated with creativity. The creative individual obviously relies on the other thinking operations also, of course, but these two have been found to be most characteristic of the creative individual.

For its conceptual definition of the amount of creativity in the classroom therefore, the IMPACT staff chose the proportion of time in which divergent and evaluative thinking were taking place.

The Aschner-Gallagher instrument mentioned above is a "verbal interaction analysis" which is specifically designed to measure the amounts of the Guilford thinking processes actually occurring in a given classroom. A random sample of classroom time is selected and a trained observer records at 15-second intervals the type of thinking being expressed in the talking that is going on (i.e., the verbal-interaction). The product of the analysis is a statistical distribution of classroom time among the Guilford thinking-process classifications.

There are some details of the operation of the Aschner-Gallagher method which should be noted. First, since it is nearly impossible to distinguish between Guilford's "cognition" and "memory" categories by listening to a verbal exchange, these two are combined on the Aschner-Gallagher scale. Second, in addition to the Guilford thinking processes, the analysis measures the percentage of time in the random sample in which the students were talking (and the teacher was not). Finally, the scale has a category called "routine," in which the analyst places his tallies when non-instructional (housekeeping) needs are being tended to in the classroom and no observable thinking operations are taking place.

IMPACT's adaptation of the Aschner-Gallagher technique involved the use of audio tape recordings (both video and direct-observation methods were tried, but dropped because both intruded too forcefully upon the normal classroom activity). Each sample consisted of a full hour of taped classroom conversation, but the 15-second tallies were performed only on three 10-minute periods selected at random on each tape. A 10-minute period was extended as necessary if part of the conversation was unintelligible so that a full 10 minutes of interaction would be tallied. An average of five tapes from a given classroom during a year was assumed to provide a reasonably representative sample of the thinking activities typically occurring in it.

Problems with analyst training, inter-analyst reliability (i.e., ensuring that all analysts had very similar judgment in tallying the thinking operations), teacher cooperation and other practical difficulties were found to be surmountable.

Investigation 1 actually consisted of three sub-studies, which are labeled A, B, and C in the following examination.

Sub-study A was a comparison of the behavior occurring in the classrooms of IMPACT participant-teachers with that occurring in otherwise similar classrooms in which the teacher had received no IMPACT training.

Since IMPACT participants were not chosen at random (they were selected by individual school district administrations on varying bases), there was a question as to whether there might not be some differences between IMPACT and non-IMPACT teachers which had nothing to do with IMPACT inservice training.

To distinguish between the effects of IMPACT **selection** and the effects of IMPACT **training,** three separate samples were selected for sub-study A:

113 teachers who were not selected for IMPACT's first-year training program.

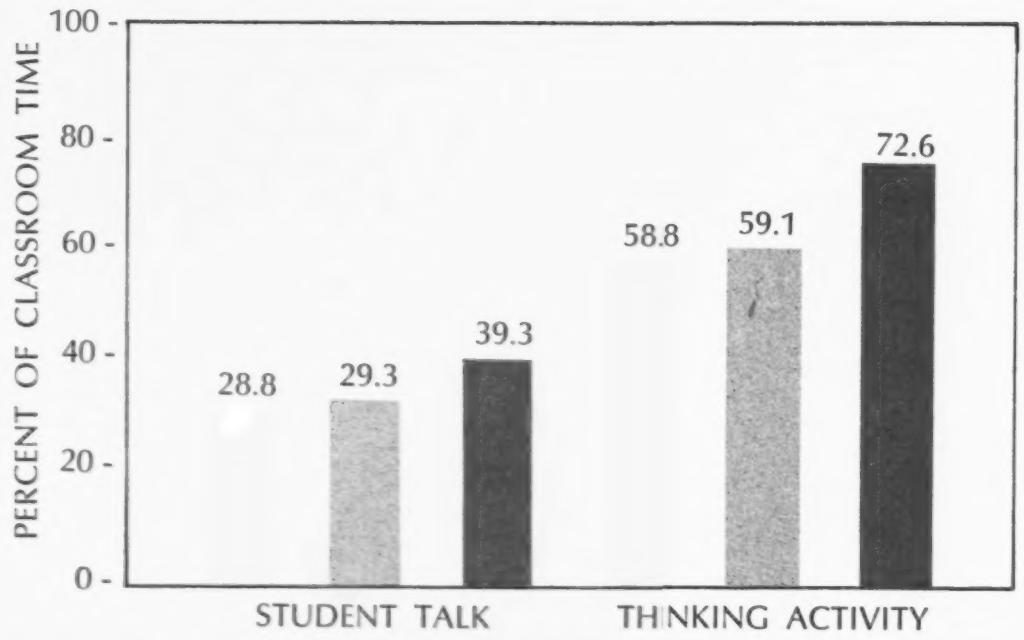
108 teachers selected for the first-year program.

212 teachers selected for IMPACT's second or third year training programs, but not having received any IMPACT training at the time the sub-study A observations were made.

The results of each sub-study appear in the accompanying bar graphs. For sub-study A, the bars on the left in the upper graph indicate the percentage of time the students (as opposed to the teacher) were talking. The bars on the right in the same graph indicate the percentage of time when some thinking (as apposed to "routine" non-thinking activities) was evident. The lower graph is a breakdown of the same thinking percentages indicating what percentage of the time was devoted to each of the four thinking processes.

INVESTIGATION I — IMPACT VS NON-IMPACT DATA
SUB STUDY A

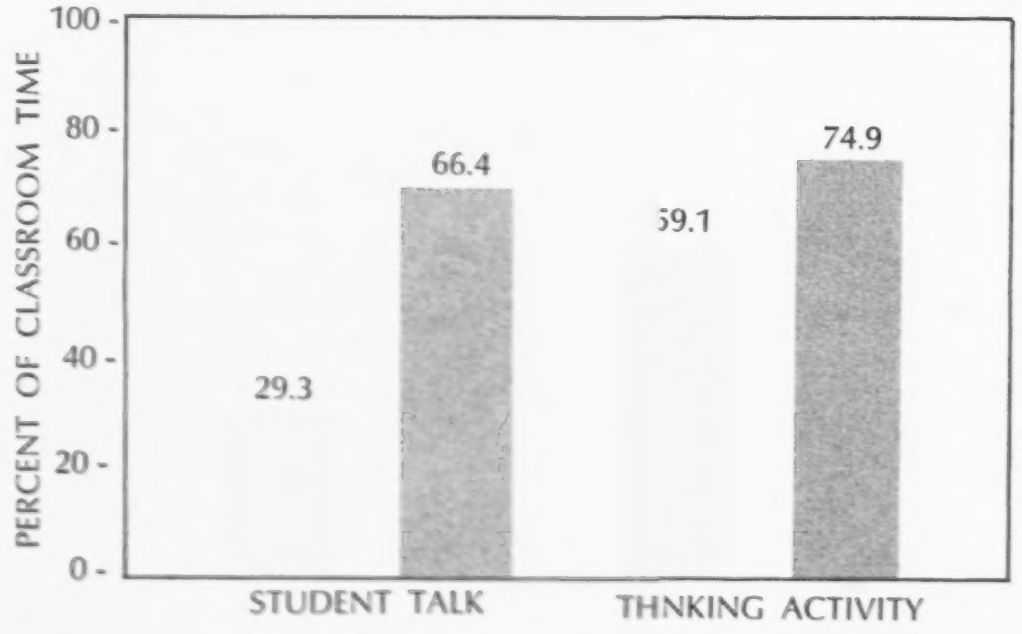
Selected for IMPACT	No	Yes	Yes
Years IMPACT training at time of study	0	0	1
Teachers in sample	113	212	108



THE EFFECT OF IMPACT TRAINING . . . THE BUILD-UP
SUB STUDY B

BEFORE AFTER

Number of teachers
1967 - 68 = 22
1968 - 69 = 91
TOTAL 113



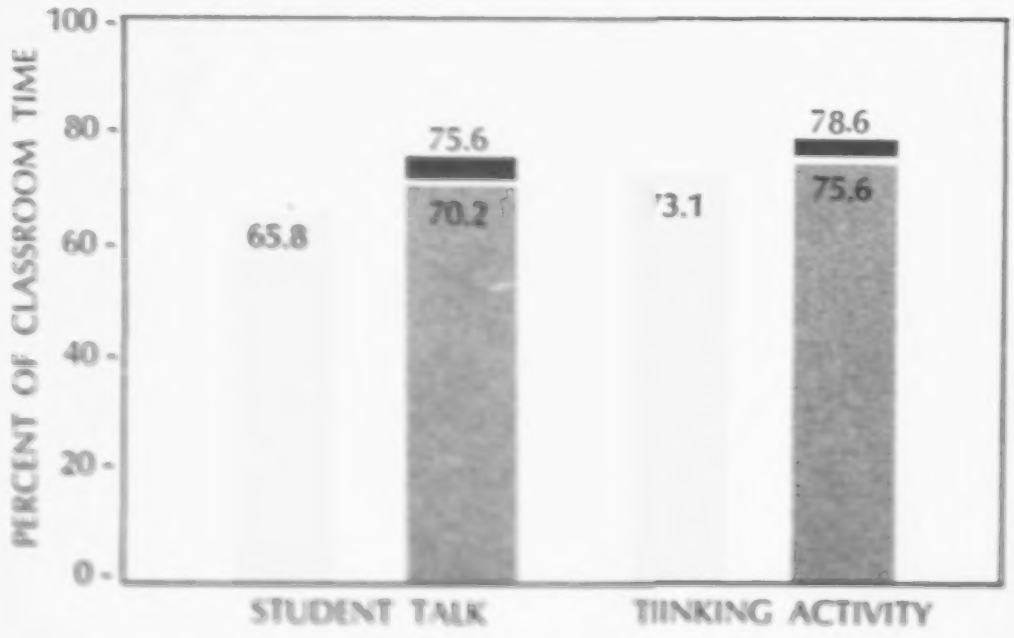
THE EFFECT OF IMPACT TRAINING . . . RETENTION
SUB STUDY C

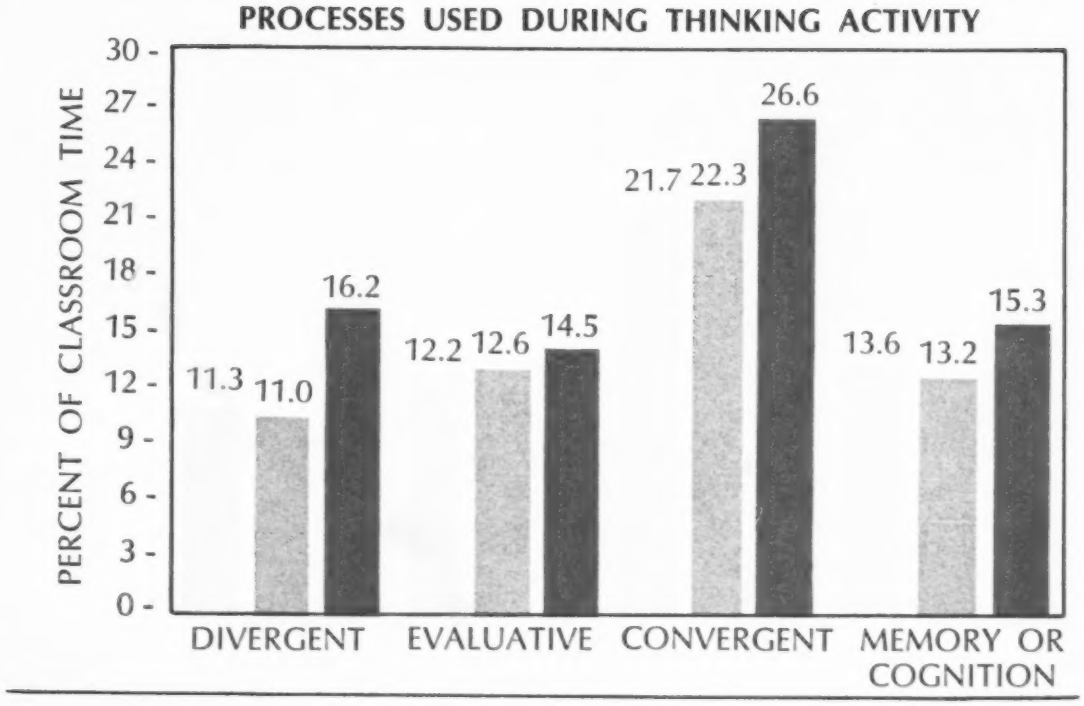
Number of Teachers — 82

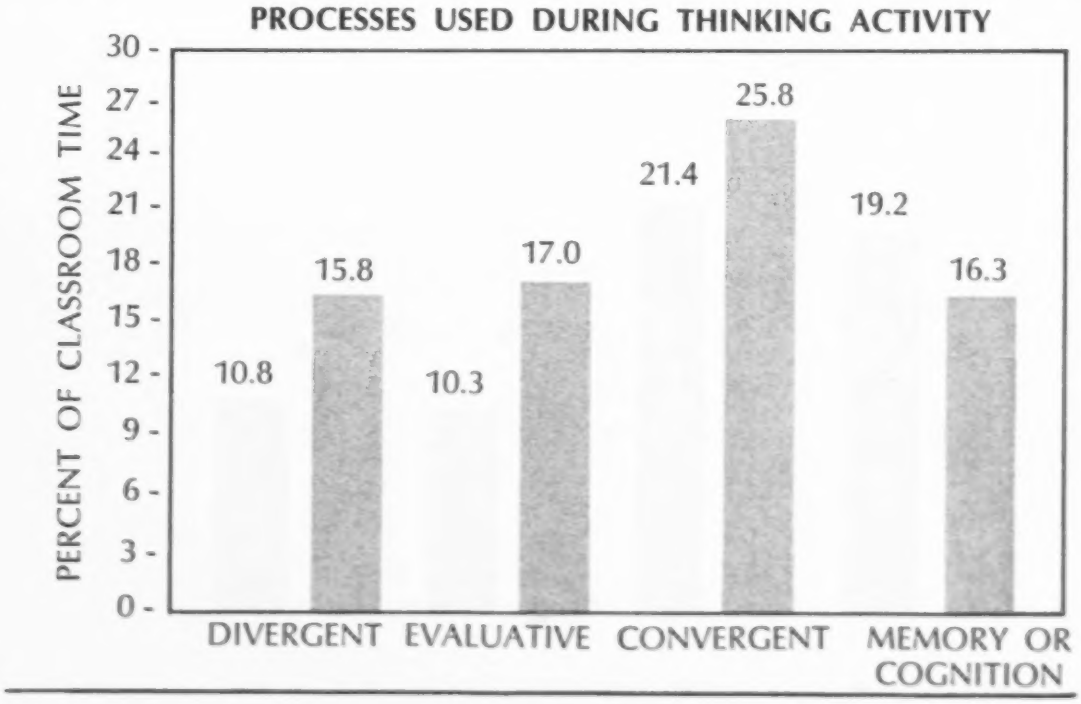
During IMPACT training

During year after training. Approximately 5 tapes

During second year after training — 2 tapes per teacher




PROCESSES USED DURING THINKING ACTIVITY
PERCENT OF CLASSROOM TIME
30 -
27 -
24 -
21 -
18 -
15 -
12 -
9 -
6 -
3 -
0 -
11.3
11.0
16.2
12.2
12.6
14.5
21.7
22.3
26.6
13.6
13.2
15.3
DIVERGENT
EVALUATIVE
CONVERGENT
MEMORY OR COGNITION


PROCESSES USED DURING THINKING ACTIVITY
PERCENT OF CLASSROOM TIME
30 -
27 -
24 -
21 -
18 -
15 -
12 -
9 -
6 -
3 -
0 -
10.8
15.8
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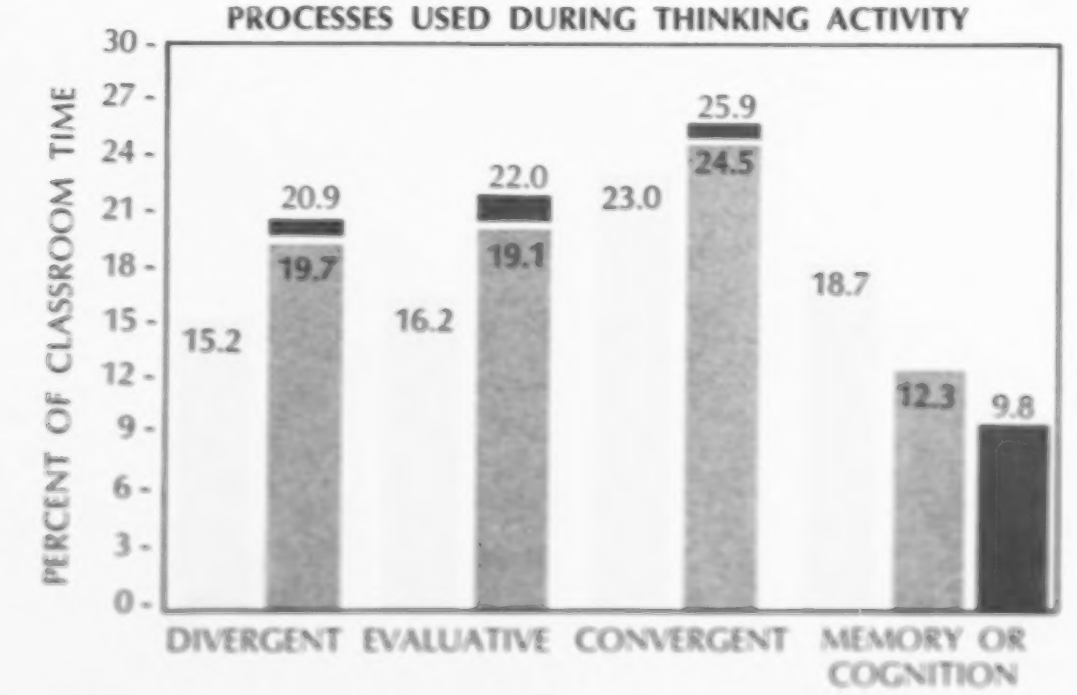
17.0
21.4
25.8
19.2
16.3
DIVERGENT
EVALUATIVE
CONVERGENT
MEMORY OR COGNITION


PROCESSES USED DURING THINKING ACTIVITY
PERCENT OF CLASSROOM TIME
30 -
27 -
24 -
21 -
18 -
15 -
12 -
9 -
6 -
3 -
0 -
15.2
20.9
19.7
16.2
22.0
19.1
23.0
25.9
24.5
18.7
12.3
9.8
DIVERGENT
EVALUATIVE
CONVERGENT
MEMORY OR COGNITION

"If teachers are effectively performing their job in the right way, then it must be their responsibility to attempt to develop or release that amount of potential or human development which is there."

—Frank E. Williams

According to the figures illustrated in the bar-graphs for sub-study A, IMPACT teachers encouraged more student participation in class, used a greater percentage of classroom time in activities which actually involved thinking, and devoted more time to convergent, divergent, and evaluative thinking.

Since the non-IMPACT and beginning-IMPACT samples show similar profiles, the effects shown in the graphs seem to be more attributable to IMPACT training than to selection procedures for IMPACT participants.

Sub-study B had the same general goals as sub-study A, but a somewhat different research design. Whereas sub-study A compared the results of a single analysis of different teacher groups, sub-study B compared the profiles of the **same** teachers before and after they received IMPACT training. In the sub-study B sample were 113 teachers, 22 of whom were trained during IMPACT's first year and 91 in its second year. All participating teachers for whom both before-training and after-training tapes were available for analysis were included in this sample.

The bar graphs for sub-study B look much like those for sub-study A and may be similarly interpreted. After teachers had participated in IMPACT training sessions, student-talk rose from less than 1/3 of the time to about 2/3 of the time in their classrooms. During the course of their training, the percentage of time spent on actual thinking activities—as opposed to routine, or non-instructional activities—rose from less than 60% to nearly 75%. (The routine, obviously, made a corresponding drop from 40% to 25%.) This increase in the amount of time spent on actual thinking activities resulted in a marked rise in the amount of divergent, evaluative and convergent thinking categories, as seen in the lower graph for sub-study B. Evidently, the teachers used the additional time granted them by the reduction of classroom routine to increase the amount of the thinking operations associated with creativity.

The third sub-study, C, sought to determine whether the results of IMPACT training were retained after the teacher left the formal training program. The comparison shown in the sub-study C bar graphs is between observations made during the year of IMPACT training program, 5 tapes made on the same teachers during the following year, and 2 tapes made the second year after training. Only those teachers who participated in IMPACT's first training year could be tested in sub-study C, since IMPACT had only been in operation three years at the time. This resulted in a sample of 82 teachers.

Sub-study C suggests that the effects of IMPACT inservice training persist after teachers have left active participation in the program and are "back on their own." Furthermore, the profiles show that, in fact, there is additional **growth** in each of the three dimensions shown in the bar graph in the first year and slight advances again the second year after training. Percentages of student-talking time, thinking activity time, and time devoted to divergent, evaluative, and convergent processes all increased. Time devoted to exclusively memorative-cognitive process showed a distinct decline.

It should be understood that, while sub-studies B and C traced the progress of the same **teachers** over a period of time, they did not normally involve the same **students** over time. This is not considered a serious deficiency in these sub-studies, provided the assumption is accepted that the teacher has the primary influence on the types of activities that take place in his classroom. Further, any variance in the "creativity" of classes of children may be assumed to be self-cancelling

in the large sample sizes used in the sub-studies. At any rate, there is no apparent way of controlling for this change of students, since teachers in all but extraordinary situations have to teach a new set of students each year.

Second Year

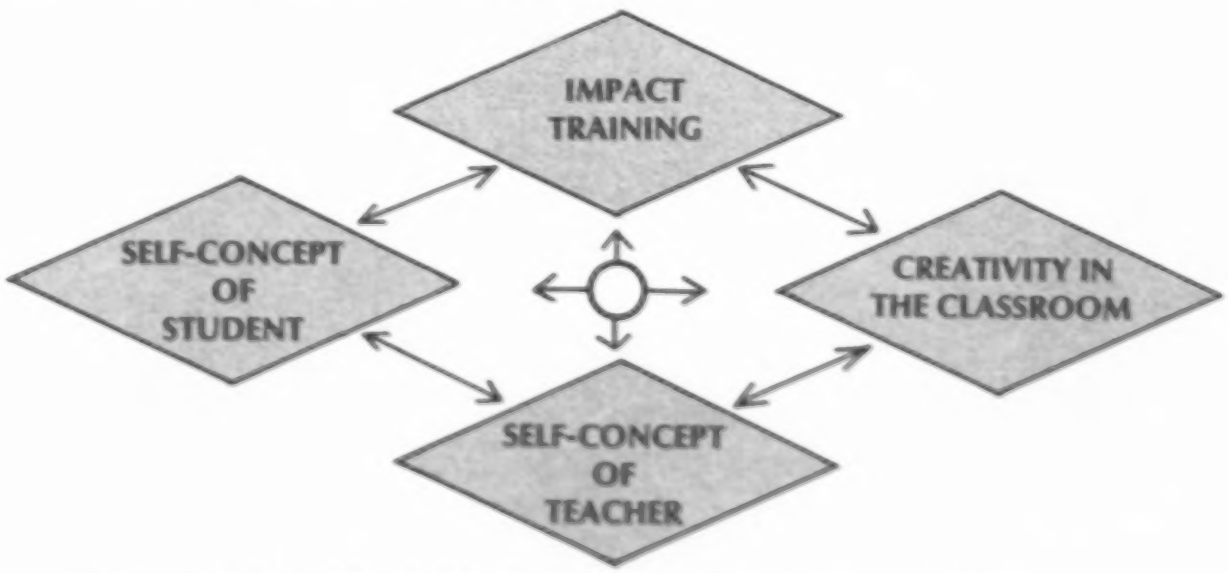
During IMPACT's second year, its orientation and emphasis became somewhat modified. The possibility of encouraging classroom creativity in a less direct way had gained the attention of the staff. An indirect approach to creativity, through feelings, emotions, motivations and attitudes, was suggested by a considerable body of research as well as by IMPACT's first-year experiences.

In particular, it appeared extremely likely that a person's self-perception or self-concept is closely related to his creativity. Humanizing and individualizing the activities in the classroom in order to strengthen teachers' and students' self-concepts came to be a major emphasis of IMPACT's training program.

In keeping with this broadened definition of IMPACT's orientation, the means of evaluating its training were likewise broadened.

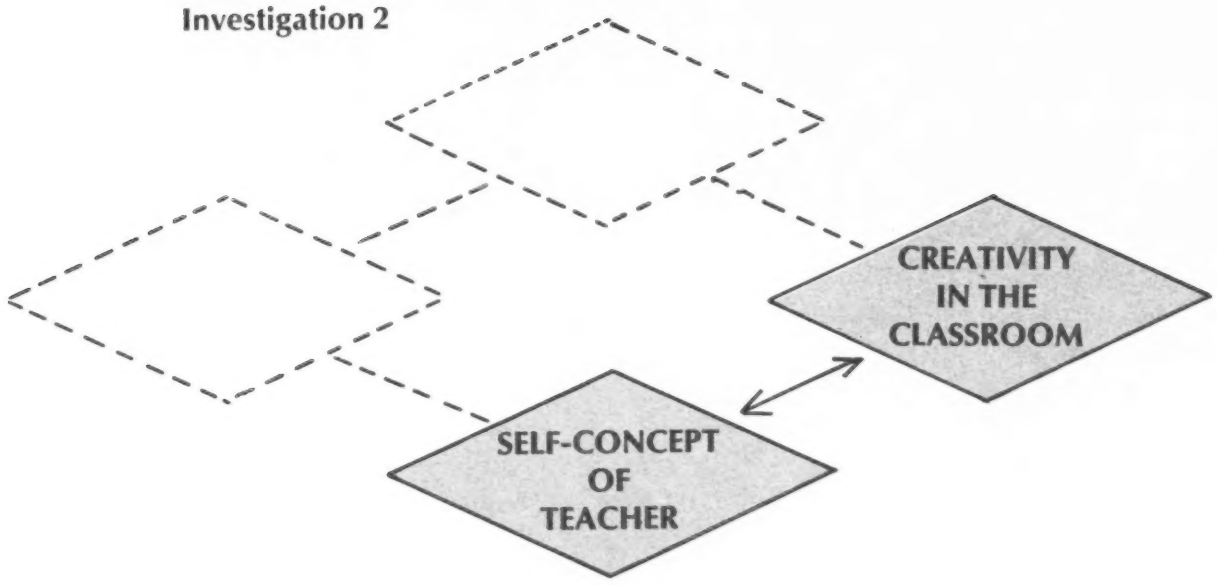
Certain instruments for the measure of self-concept were seen as useful for evaluating the new emphasis of the program. Moreover, since self-concept instruments can be applied to students as well as to teachers, a means for carrying out evaluation at the student level was now available. The IMPACT staff long had felt that direct attempts at evaluating IMPACT through the creativity criteria netted little indication of the project's influence on the student (as opposed to the teacher).

Five new investigations were undertaken during the second year, each related in some way to self-concept measures. All evaluative investigations attempted to date, including Investigation 1 described above, can be represented by a diagram or model.



The upper-right side of this diagram has been introduced above in the discussion of Investigation 1. The two diamond shapes at the left and bottom of the diagram represent the self-concept of the student and the teacher, respectively.

Investigations 2, 3, 4, 5, and 6 are represented by lines joining one diamond shape to another. These second-year investigations therefore present **indirect** evidence connecting IMPACT training with its main objectives, in which the path of that indirect evidence goes through one or both of the self-concept measures. The purpose of the diagram is simply to give the reader some idea of the way the studies are interrelated. The investigations are described individually below.



Investigation 2 was a study of the relationship between a teacher's self-concept and creativity in the classroom. Previous work by researchers in other fields indicated that creativity is associated with certain personality traits, among which are: autonomy, non-conformity, high self-awareness, breadth of perspective, flexibility of thinking, high ego-strength, and intrinsic motivation. Since each of these qualities is also indicative of an individual with high self-concept, some relationship between self-concept and creativity was expected.

The same measures of creativity in the classroom (i.e., the Aschner-Gallagher interaction analysis) was used for Investigation 2 as for Investigation 1. The staff realized that self-concept is exceptionally difficult to measure, so the search for adequate tools for measurement of self concept was crucial to the study.

Finally chosen for the measurement of self-concept in teachers was the **Tennessee Self-Concept Scale.** This is a 100-item self-reporting instrument on which the person being measured indicates on a five-position scale the way he perceives himself. Although the items are arranged in several sub-tests, the total self-concept score was accepted as indicating the teacher's self-concept.

The **Tennessee Self-Concept Scale** is probably as good an instrument for measuring adults' self-concepts as has so far been devised: since the publication of these scales in 1965, they have been widely

used and studied in many research investigations as well as in clinical and school settings.

The sample for Investigation 2 consisted of 208 Polk County teachers from seven school districts; 167 were elementary teachers and 41 taught at the secondary level. About half of the teachers had participated in the IMPACT program and half had not.

Samples of classroom behavior were collected from the classroom of each teacher in the sample. On the average, five one-hour samples were collected per teacher. Since the samples were taken over a two-year period, and since secondary teachers shift from one class to another throughout the day, the samples for a given teacher usually involved more than one group of students.

"...As students find the teacher relevant and the school relevant, they will fight to become involved."

—Raymond Houghton

The **Tennessee Self-Concept Scale** was administered to each of the 208 teachers under conditions intended to encourage careful and honest response to each item. Anonymity was carefully preserved, and each teacher was given an opportunity for a personal interpretation of the self-concept scale if he requested it. In addition, the fact that all of these teachers were cooperative enough to make available tape recordings of their classroom activities led the staff to believe they would be especially conscientious in filling out the self-concept inventory.

The accompanying table indicates the results of Investigation 2, expressed in the form of correlation coefficients.* The correlation is between the teacher's self-concept score and the proportion of class time devoted to the various thinking processes (as measured by the Aschner-Gallagher technique).

CORRELATION COEFFICIENTS
TEACHER'S SELF-CONCEPT & PROPORTION OF CLASSROOM TIME

Sample	Divergent Thinking	Evaluative Thinking	Memory	Convergent Thinking	Routine
167 Elem. Teachers	.43	.52	—.43	—.20	—.37
41 Sec. Teachers	.39	.48	—.49	—.20	—.40

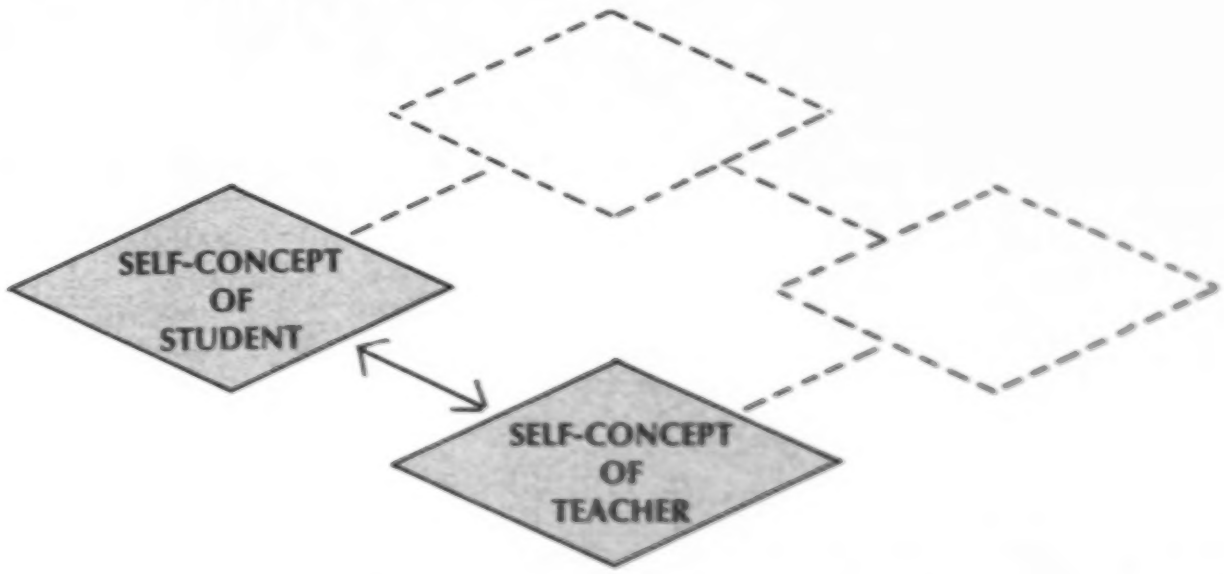
All results shown in this table are significantly different from zero, meaning that the correlation indicated is highly unlikely to be due to chance fluctuation. Further, the elementary and secondary results are **not** significantly different from one another; hence, we can view the results as not being dependent upon grade level.

Since the proportions of divergent and evaluative thinking are the criteria for "creativity" in the classroom, this investigation seems to indicate a positive relationship between these creative criteria and the teacher's self-concept. The negative correlations with memory, routine and, to a lesser extent, convergent thinking provide collaborative evidence pointing to the same conclusion. The thinking-category data are mutually exclusive, of course, and therefore not independent.

*A correlation coefficient is a number between —1 and +1 which indicates the degree to which two different variables are linearly related. A correlation coefficient at or near 0 is an indication that the two variables are independent of one another; a coefficient close to +1 indicates that the two "go up and down" together in a mathematical relationship. The Fahrenheit and Centigrade readings on a two-scale thermometer exemplify this sort of relationship. A coefficient greater than 0 but less than 1 is an indication of some tendency for the two variables to go up or down together, and the indication is stronger the higher the value of the coefficient; correlation coefficients with a minus sign (—) have a similar meaning; the tendency in this case being for one variable to go down when the other goes up.

The evidence here seems to be telling us that the more creative teachers (according to the criteria adopted) tend to be the ones with higher self-concept and therefore that IMPACT's efforts to strengthen teacher self-concept may well be indirectly encouraging creativity in the classroom.

Investigation 3



Investigation 3 attempted to relate the self-concept of the teacher to the self-concept of his pupils. The measuring instrument for the teacher self-concept was, again, the **Tennessee Self-Concept Scale.** The instrument for measuring student self-concept was Stanley Coopersmith's **Self Esteem Inventory.**

The search for an adequate, meaningful tool to measure a child's self-concept was the most difficult (and crucial) part of this study; maintaining an atmosphere conducive to honest, responsible responses was the next most difficult.

The Coopersmith **SEI** is a self-report or self-inventory which is in some ways similar to the **Tennessee Self-Concept Scale.** It is specifically designed for children, however, rather than for adults. It asks only whether a certain attitude or characteristic is "like me" or "not like me" as the child perceives himself. The maximum score, representing the highest possible self-concept, is 100. The national average score is 70.

The sample used consisted of 68 elementary classes, each of which was "self-contained," i.e., had a single teacher for most subjects taught (the students would go elsewhere only for music, art or gym). The self-concept instruments were administered at the end of the school year, so that the students had been with their teacher for nearly a full academic year.

Mean self-concept scores for students were computed for each classroom separately; then a correlation coefficient was computed relating these mean student self-concept scores to the self-concept score of their respective teachers. The correlation coefficient was .27—not a particularly high level of correlation, though significantly different from zero.

To test the hypothesis that the correlation might be higher if the

students were exposed to the teacher longer, another sample of 27 self-contained classes was found in which the same students had one teacher for **two** full school years. These tests, administered at the end of their second year, produced a correlation coefficient of .34, which is also significantly different from zero.

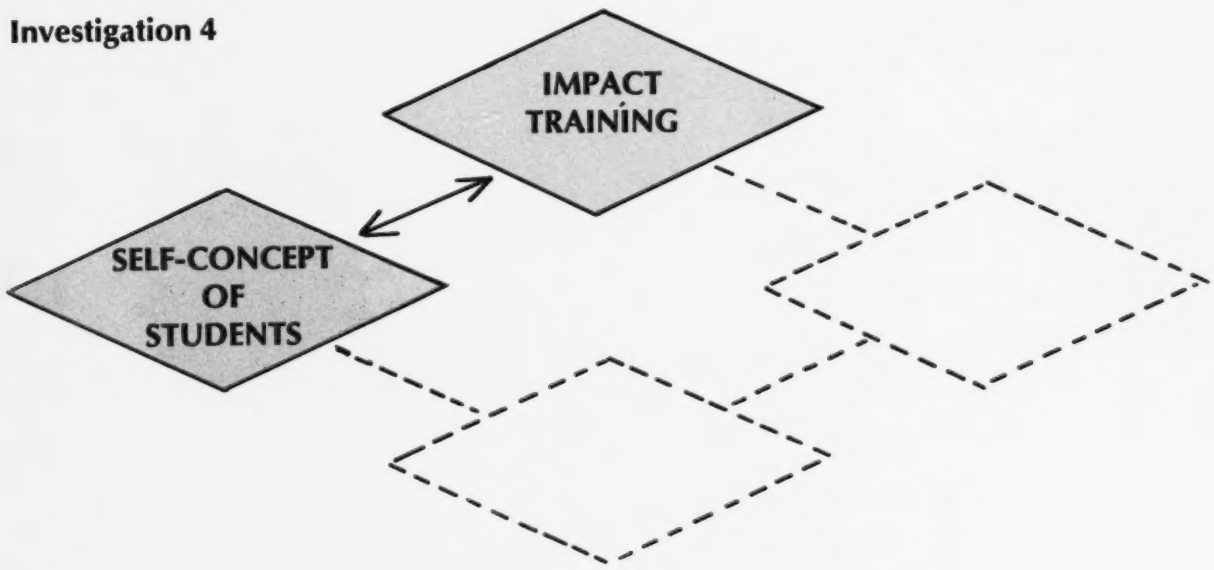
The higher correlation in this two-year-exposure sample is suggestive that the longer students are with one teacher, the more likely it is that their self-concepts will tend to match the teacher's self-concept. The results in this instance were not, however, sufficiently higher to meet the usual tests of statistical significance. The possibility that the additional correlation in the "two-year" study was due purely to chance cannot be ruled out.

Investigation 3 indicates, nevertheless, that the self-concepts of children in a classroom are, to some degree, related to their teacher's self-concept, although other forces also obviously are at work. Correlation coefficients tell us nothing with regard to cause-and-effect, but there seems to be little doubt that the statistical relationships discovered in Investigation 3 show that the teacher's self-concept somehow "rubs-off" on the student.

"We are, above all, dishonest about our feelings, and it is this sense of dishonesty of feeling that makes the atmosphere of so many schools so unpleasant. The people who write books that teachers have to read say over and over again that a teacher must love all the children in a class, all of them equally. If by this they mean that a teacher must do the best he can for every child in a class, that he has an equal responsibility for every child's welfare, an equal concern for his problems, they are right. But when they talk of love they don't mean this; they mean feelings, affection, the kind of pleasure and joy that one person can get from the existence and company of another. And this is not something that can be measured out in little spoonfuls, everyone getting the same amount."

—John Holt

Investigation 4



Investigation 4 was designed to study the relationship between IMPACT training and the self-concepts of students as measured by the Coopersmith **Self-Esteem Inventory.** The sample studied consisted of 64 elementary classrooms in Polk County, of which 32 were taught by IMPACT teachers and 32 were taught by teachers who had not participated in IMPACT. Each class had primarily one teacher throughout the school year, a factor obviously important to the purposes of this investigation.

In order to control for extraneous factors to the extent possible, both IMPACT and non-IMPACT samples were "balanced" as to school grade—16 upper elementary and 16 lower elementary—and on geographical location of the school—16 in federally-designated Title I "target" areas assumed to contain predominently culturally-disadvantaged students and 16 schools not so designated. In the 16 target-area

schools, the percent of black student enrollment ranged from 15.6 to 80.3, with a mean of 32.1%.

Also, because of the possibility that intelligence might prove to be an important extraneous factor, results of IQ tests (Lorge-Thorndike) administered by the schools were obtained and recorded for all students in the sample. Each child's most current reading test score was also obtained.

Toward the end of the school year, students in each of the 64 classrooms were given the **SEI,** and the mean scores in each classroom were computed. Results were analyzed by the analysis-of-variance technique. The important results of the analysis are shown in the following table and briefly explained in the numbered paragraphs which follow:

"The world is undergoing a transformation to which no change that has yet occurred can be compared, either in scope or rapidity."

—Charles DeGaulle

MEAN STUDENT SELF-CONCEPT SCORE

	In Target Area Schools	In Non-Target Area Schools	All
IMPACT Classrooms	81.1	74.0	77.6
Non-IMPACT Classrooms	73.2	71.3	72.2
All	77.2	72.7	74.9

1. The column on the right shows a mean self-concept score for the 32 IMPACT classrooms as 77.6, while that of the 32 non-IMPACT classrooms is 72.2. The difference is large enough to be statistically significant and hence not likely to be the result of chance in choosing the sample.

2. The bottom row shows the mean student self-concept score for the 32 target-area classrooms was 77.2, while for the 32 non-target area classrooms it was significantly lower at 72.7. At first, this higher score in the "disadvantaged" area seems surprising, although similar results have appeared in recent research,—e.g., those by Dr. Wilbur Brookover at Michigan State University, Dr. Morris Rosenberg of the National Institute for Mental Health, and Drs. Anthony and Louise Soares in Bridgeport, Connecticut.* Partly as a result of these findings, IMPACT's future research program will be particularly oriented to evaluation in schools located in culturally-deprived areas. The first effort will be to distinguish those sub-areas within the self-concept instrument which seem most to differentiate between advantaged and disadvantaged children.

3. The difference in student self-concept between IMPACT and non-IMPACT classrooms was considerably more marked in the target-area classrooms (81.1 vs 73.2) than in non-target area classrooms (74.0 vs 71.3). This is a

*The finding that the disadvantaged had the higher self-concept score is interesting, although not directly related to the evaluaion of IMPACT at this time. In particular, it should be noted that the culturally disadvantaged schools in Polk County are integrated, with an overall black minority. The results are therefore not necessarily racially-determined. In both predominantly-white and predominantly-black classrooms, the findings were similar. Some researchers (e.g., Soares) have hypothesized that such results would not be found in integrated schools.

statistically significant result and is considered important to the evaluation of the IMPACT program.

4. No significant differences developed between upper elementary versus the lower elementary grades. Since the research was designed to uncover such differences had they been present, all elementary grade levels are combined in the display shown in the table. Any relationship between IMPACT training and student self-concept may be assumed not to depend on grade level within the elementary grades. It does not follow, however, that elementary versus secondary levels would make no difference.

5. IQ differences did not prove to be a complicating factor. Correlation coefficients between IQ and student self-concept fell within the .10 to .15 range for all grade levels and social-economic divisions, with an overall correlation coefficient of .136.

6. Reading test scores were available for all students in the sample. A correlation was made between reading test score and self-concept score in the 64 classrooms. In the 32 target-area classrooms, the resultant coefficient was .36, and in the 32 non-target area classrooms it was .39. However, the correlation coefficient **for all 64 classrooms** combined was only .06. This finding of low correlation between self-concept and reading test score when the groups were "mixed" is due to the fact that the target-area students tended to have higher self-concepts and the non-target area students tended to have higher reading test score. Within a social-economic division, however, self-concept and reading-test scores appear significantly related.

The primary implication of Investigation 4 seems to be that students of IMPACT teachers have a higher self-concept than students of non-IMPACT teachers; and that this is true in both target and non-target area schools, but especially in the former.

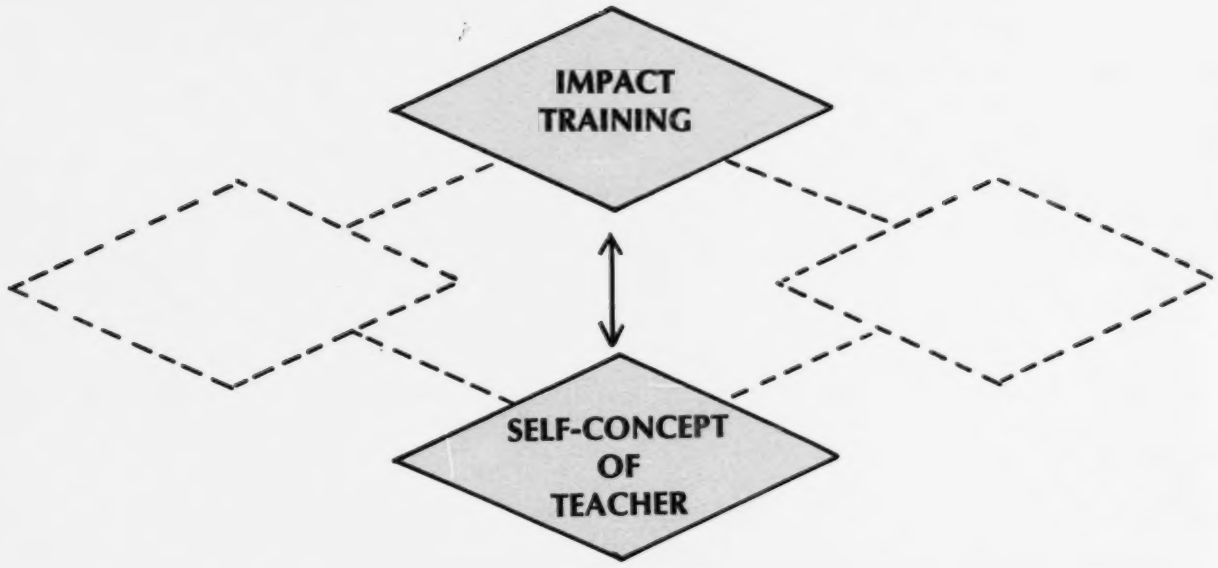
Again, one must be careful in assuming a cause-and-effect relationship. It might be natural to assume that IMPACT training has a direct and positive influence on a student's self-concept and hence, by inference, on his creativity. The effect of IMPACT training on students is necessarily indirect, however, because the training program includes only teachers.

Two hypotheses are suggested for the findings in Investigation 4:

(1) The teacher with a high self-concept somehow transfers this self-concept to his students and thereby generates a feeling of greater self-worth in them; or

(2) the teacher's behavior in terms of classroom teaching activities (such as the thinking processes studied in Investigation 1) in some way improves the child's concept of himself. For example, if the teacher encourages more divergent and evaluative thinking, perhaps the child's self-concept "grows."

Investigation 5



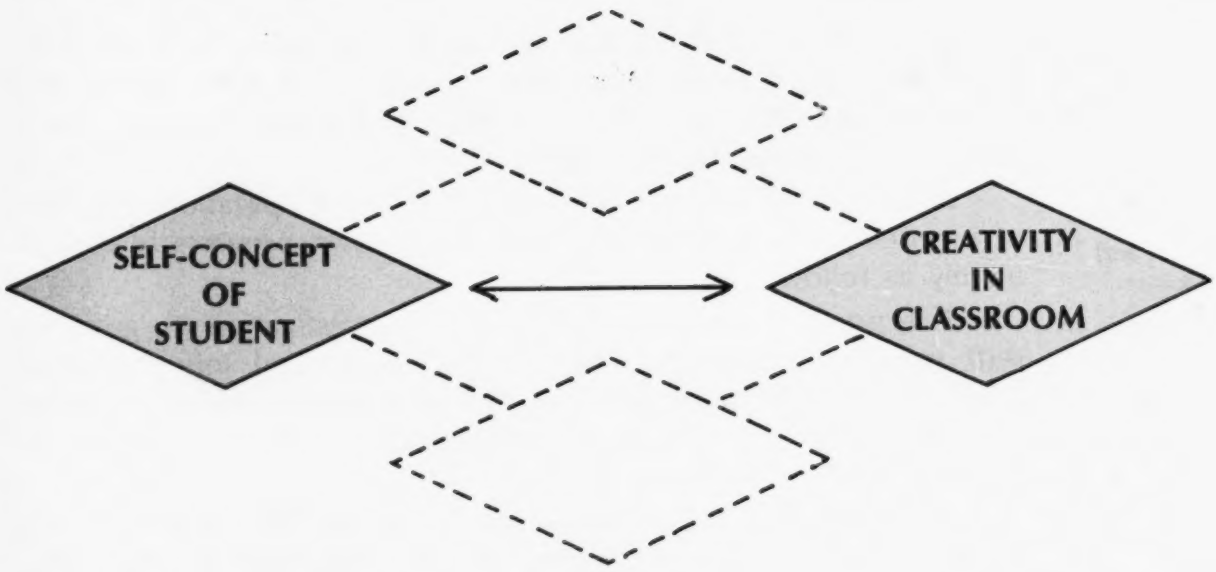
Investigation 5 was a comparison of mean self-concept scores of teachers who had received IMPACT training versus those who had not. The instrument, once again, was the **Tennessee Self-Concept Scale,** administered to the IMPACT sample at the end of one year's exposure to IMPACT inservice training.

	MEAN SELF-CONCEPT SCORE
94 IMPACT teachers	376.1
130 Teachers just entering IMPACT	348.2
121 Teachers never in IMPACT	346.6

The difference indicated between teachers who had received IMPACT training from those just entering the program was highly significant. In statistical terms, the IMPACT teachers' mean score was more than one standard deviation above the national mean score (350). This result is particularly interesting in that it helps with the interpretation of Investigations 1 and 4. In Investigation 5, the entering-IMPACT sample of teachers had been subject to the same selection process as had the IMPACT sample. Those entering-IMPACT teachers were tested after their selection but before any training had commenced. It therefore seems reasonable to believe that the higher self-concept of IMPACT teachers is associated with the inservice training itself rather than the selection process. More evidence on this point can be obtained one year hence, when the entering-IMPACT sample used in Investigation 5 can be re-tested after having received a year of IMPACT training.

In the process of administering the self-concept studies for Investigation 3, some teachers who had no intention of entering the IMPACT program were given the **Tennessee Self-Concept Scale.** Their mean self-concept score was 346.6, only slightly below that of the entering-IMPACT sample in Investigation 5. The difference is not statistically significant. Evidently, then, there is no difference in the self-concept of teachers who enter the IMPACT program and those who do not.

Investigation 6



Investigation 6 examined the final relationship suggested by the model for the overall evaluation of IMPACT. In this investigation the emphasis was on student self-concept as it relates to creativity in the classroom. Like Investigations 2 and 3, no direct evaluation of IMPACT training is attempted in Investigation 6; and, also like Investigation 2, this was an exploration of the self-concept-creativity relationship.

The methodology of Investigation 6 is essentially the same as that of Investigation 2, with the mean self-concept scores of the students (measured by the **SEI**) being used here instead of those of the teachers.

In this case, the sample included only elementary classrooms—114 in number—and the percentages of classroom time against which the self-concept scores are compared refer exclusively to Aschner-Gallagher tallies made while the students (not the teacher) were talking.

The resulting correlation coefficients are shown below:

CORRELATION COEFFICIENTS

STUDENT MEAN SELF-CONCEPT SCORE
and
PROPORTION OF CLASSROOM TIME

Divergent Thinking	Evaluative Thinking	Memory	Convergent Thinking	Routine
.21	.23	—.24	—.23	—.19

While all of these results are significantly different from zero, none of them are of very high value. They have a striking similarity, although at a lower level, to the results of Investigation 2.

Student self-concept and creativity in the classroom seem to have a tendency to go together, although the same admonition regarding cause-and-effect as mentioned above holds true here. Any of the following hypotheses is thought equally likely to explain the results of Investigation 6:

(1) Creativity in the classroom arises from high student self-concept.

(2) Student self-concept arises from creativity in the classroom.

(3) Student self-concept and creativity in the classroom are both results of creative (or high self-concept) teachers.

The IMPACT research staff has some preference for the last hypothesis, since it seems likely that the teacher wields predominant influence upon whatever occurs in the classroom.

The IMPACT Research in Brief

"Revolutions . . . occur, in the main, because new generations take hold of old ideas and concepts . . . and honor them as being serious."

—H. Jesse Arnelle

At the end of Project IMPACT's 2½ years of operation, the status of its attempts to measure and evaluate its own progress is approximately as follows:

The primary evaluation of IMPACT (Investigation 1) gives the staff reasonable assurance that IMPACT is indeed influencing the thinking processes taking place in the classrooms of IMPACT teacher-participants. It is, in fact, influencing them to encourage "creative" thinking in their students.

Hopefully, the classroom environment resulting from this sort of change in teacher and student behavior will result in more creative products from the education system—i.e. more creative men and women. Such a satisfactory result is hardly demonstrable today.

Two subsidiary indications of IMPACT training's results (Investigations 4 and 5) lead the IMPACT staff to believe that the project is influencing these self-concepts of both teachers and students.

The influence on the teacher's self-concept may be relatively direct, since the teacher is directly exposed to IMPACT training. The influence on the student's self-concept is no doubt an indirect one, probably through either (or both) the self-concept of the teacher or the creative thinking processes the students themselves perform in the classroom.

In any event, IMPACT now has some indication that it can make some meaningful measurements at the student level, at least with respect to self-concept.

Finally, some further evidence has been added with regard to the supposition that a high self-concept may be one aspect of creativity. Investigation 2 (and to a lesser extent, Investigation 6) adds to the evidence supporting this supposition, in that both teachers and students who have a higher self-concept tend to use more creative thinking.

The research results described in this report give the IMPACT staff some confidence that the project is achieving its objectives.*

*Research results described in this chapter have been deposited with the American Society for Information Science, 2000 "P" Street, N.W., Washington, D.C. 20036.

Research Bibliography

Coleman, James S., **et al. Equality of Educational Opportunity.** Washington, D.C.: Office of Education, U.S. Department of Health, Education and Welfare, 1966. p. 743.

Coopersmith, Stanley. **The Antecedents of Self Esteem.** San Francisco: W. H. Freeman and Co., 1967. p. 283.

Fitts, William H. **The Self Concept and Human Behavior.** Nashville, Tenn.: Nashville Mental Health Center Press, 1965. p. 18.

Fitts, William H. **Tennessee Self Concept Scale.** Nashville, Tenn.: Counselor Recordings and Tests, 1965. p. 6.

Guilford, J. Paul. **The Nature of Human Intelligence.** New York: McGraw Hill, 1967. p. 539.

Soares, Anthony T., and Soares, Louise M. "Self-Perceptions of Culturally Disadvantaged Children," **American Education Research Journal** VI, (January 1969), 31-45.

Trowbridge, Norma T. "An Approach to Teaching a Large Undergraduate Class," **Educational Psycholoist,** VII, No. 2, (Feb. 1970), 3-6.

Trowbridge, Norma T. "Effects of Socio-economic Class on Self Concept of Children," **Psychology in the Schools,** in press, 1970.

Trowbridge, Norma T. **Project IMPACT, Research Report 1968-1969.** Des Moines, Iowa: Polk County Education Press, 1969. p. 33.

Wylie, Ruth C. **The Self Concept.** Lincoln, Nebraska: University of Nebraska Press, 1961. p. 390.

Witty, Paul A. (Ed.) **The Educationally Retarded and Disadvantaged.** Sixty-sixth yearbook, Part I. Chicago, Ill.: National Society for the Study of Education, 1967. p. 384.

U. S. Commission on Civil Rights. **Racial Isolation in Public Schools.** Vol. I. Washington, D.C.: Government Printing Office, 1967.

WHAT THE BOSS THINKS . . .
comments from Ralph C. Norris

"The I.Q. is a fairly good index of whether or not a child will get good grades in academic subjects. So far as general intellectual assessment, it is pitifully limited."

—J. P. Guilford

As the introduction to this booklet indicates, education in the United States is big business. About $65 billion was spent on education last year. But, of this total expenditure for education only a fraction of one per cent was spent for research, development and evaluation. And that miniscule percentage was, by and large, spent on college and university campuses. Practically none was spent for research and development by the public school systems.

As Frank Fogarty recently pointed out in an article in the New Jersey Standard Oil Company's publication **The Lamp,** "No major industry would expect to progress satisfactorily unless it invested many times that amount in research and development."

In Project IMPACT, we have devoted more than two years to an attempt to measure the effects of certain techniques for nurturing creative, productive thinking and methods of humanizing the classroom climate. In my judgment, we have made some very phenomenal progress toward successfully measuring these illusive attributes.

The information we have developed as a result of these two years' work with hundreds of teachers and students is quite possibly more significant than all the data gathered in all the previous research done in south-central Iowa schools.

Having said this, however, we must admit that what we have learned thus far is only a beginning. We must continue for many years and many more educators must become involved. Only then will we have the data necessary to substantiate the ultimate value of IMPACT's goals.

It's only over the long haul, too, that we will achieve the all-important attitude changes that all of us in education will have to make if human values in our schools are to take precedence over all other values. We must learn how to proceed in the classroom to teach so as to discover and then develop all the talents of every student. Teachers need to become "managers" of the learning process. They need to talk less and think more. Secondary as

RALPH C. NORRIS
Superintendent of Schools

well as elementary teachers must learn to place higher importance on persons than on subject-matter; to realize that subject matter is only a means to achieve self-actualization of people.

In the relatively short existence of IMPACT, however, it has shown clearly that creative thinking **can** be nurtured (if not taught) in daily teacher-learner activities at all levels. This enhances the validity of the National Education Association's statement back in 1961 that, "The purpose of education which strengthens all other educational purposes—the common thread of education—is the development of the ability to think."

It has demonstrated, too, that it is possible to measure more than memorization and recall. Many teachers have long attempted to teach for productive thinking in their day-to-day classroom discussions, but few have found adequate ways to evaluate these efforts. IMPACT has shown that teachers can teach for the full range of thinking and have confidence in their ability to measure the results.

But system-wide attitude changes will not take place simply because the value of the IMPACT approaches have been demonstrated. They will occur only when leaders at all levels accept the objectives of teaching for productive thinking and humanizing the teaching-learning process as their responsibility. Leaders on the national and state levels who are responsible for policy-making and legislation have a particularly great responsibility in this regard. Researchers may theorize, educators may philosophize, and politicians may view-with-alarm. But, in the end, it is those who form policy and allocate funds who will decide whether the education needs of our children will be met.

Ralph C. Norris

Ralph C. Norris,
Superintendent

A Note about IMPACT for Administrators

—from Ralph H. Jorgensen

The Committee for Economic Development (CED) is a nonprofit, nonpartisan group composed of leading businessmen and educators. The CED is concerned with all facets of life in our country which have to do with the "preservation and strengthening of our free society . . ." One of these facets, obviously, is education.

In July of 1968, CED's research and policy division published a statement of policy entitled, **Innovation in Education: New Directions for the American Schools.** The statement focuses on elementary and secondary instruction, and states in part:

1. We are convinced that a most pervasive problem in American schooling **is the need for improving instructional techniques and processes.***
2. Such improvement is the precondition for achieving better education for all—for those from poor families as well as those from affluent families, for the culturally deprived as well as the advantaged.
   *my italics.

For those educational administrators who find themselves in agreement with CED in this statement—who believe that, in times of constant change innovation is a necessity, not a luxury—we believe IMPACT has much to offer.

You have read in this booklet of some of the theories and techniques to which IMPACT has introduced teachers in its workshops and meetings. We do not wish to leave the impression, however, that the IMPACT staff members' concerns are limited to these areas. Instead, IMPACT is interested in assisting any educator who wants to try a new idea. The only limitation to this is that the idea must be relevant in some way to education.

We believe Project IMPACT is uniquely qualified to aid local school administrators and teachers in planning, organizing and evaluating local staff meetings aimed at professional development and widening the range of instructional competencies.

Recently, for example, a school district was interested in trying an experiment in differentiated staffing. The administration knew roughly what it wanted to do, but had little available knowledge of how to request funds from the federal government to help get the experiment started. The IMPACT staff was able to assist in the develoment of a proposal under the Educational Professions Development Act so that this district can soon begin its experiment with adequate funding.

We encourage you to contact the IMPACT staff, whether you are organizing a preservice or inservice meeting for your staff or thinking of starting a full-scale innovative program which requires extensive development work.

RALPH H. JORGENSEN
Director of General Education
Polk County Board of Education

Iowa School Districts that Have Participated in Project IMPACT

Adel Community School District
Ames Community School District
Ankeny Community School District
Ballard Community School District
Baxter Community School District
Bayard Community School District
Bondurant-Farrar Community School District
Boone Community School District
Catholic Diocese of Des Moines
Carlisle Community School District
Central Dallas Community School District
Colfax Community School District
Colo Community School District
Dallas Community School District
Des Moines Independent Community School District
Dexfield Community School District
Earlham Community School District
Gilbert Community School District
Indianola Community School District
Interstate 35 Community School District
Johnston Community School District
Joint County System
(Cedar-Johnson-Linn-Washington Counties)
Knoxville Community School District
Lamoni Community School District
Lynnville-Sully Community School District
Madrid Community School District
Martensdale-St. Marys Community School District
Mason City Community School District
Maxwell Community School District
Melcher-Dallas Community School District
Menlo Community School District
Mid-Prairie Community School District
NESCO Community School District
Nevada Community School District
New Monroe Community School District
Newton Community School District
North Polk Community School District
Norwalk Community School District
Ogden Community School District
Panora-Linden Community School District
Pella Community School District
Perry Community School District
Roland-Story Community School District
Saydel Consolidated School District
Southeast Polk Community School District
Southeast Warren Community School District
Stuart Community School District
Twin Cedars Community School District
Urbandale Community School District
Van Meter Community School District
West Des Moines Community School District
Winterset Community School District
Woodward-Granger Community School District
Yale-Jamaica-Bagley Community School District

Participating Iowa Colleges and Universities

Central College
Drake University
Graceland College
Iowa State University
Iowa Wesleyan College
Simpson College
University of Iowa
University of Northern Iowa

Summer Institute Teacher Participants

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